Exploring knowledge and perceptions of Type Two Diabetes Mellitus in a selected sector of Rwamagana District's residents: Rwanda

by

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Declaration

The following study represents an original work by the author. Where works of others have been applied, it has been acknowledged in the text. This work has never been previously submitted for any degree or examination at any other University. I am exclusively accountable for the opinions, interpretations and conclusion expressed in this study.

Signature: 

Madeleine Mukeshimana Date

As the candidate's supervisor, I have approved this dissertation for submission.

Signature

Dr Zerish Zethu Nkosi

(Supervisor)

Abstract

This study was conducted to determine the level of knowledge and perceptions of Type Two Diabetes Mellitus (T2DM) among people in Rwamagana District.

A quantitative descriptive design and a cluster multistage sampling technique were used in this study. Out of a sample of 355 people, 301 voluntary participated in the study and completed the anonymous questionnaires. The response rate was 85%. The questions in the questionnaire were designed to collect socio-demographic information of the participants, their knowledge of diabetes and their perceptions of diabetes.

Analysis of findings revealed that the level of knowledge of diabetes was inadequate and low among participants. Very few participants were able to answer properly the questions aimed to explore their knowledge of the meaning, signs/symptoms, causes, risk factors, management and prevention of diabetes. In addition many participants answered that they had no knowledge about any of the aspects of diabetes explored in our questionnaire. The perceptions were also poor and inadequate, especially perceptions of diabetes management at the community level and of diabetes prevention. The perceived risk of developing diabetes was low and many participants felt that behaviour change was of no importance in the prevention of diabetes, since the majority reported that they were not planning any behaviour change in the future.

The findings suggest that there is a need for education campaigns in Rwamagana district to raise public knowledge about all aspects of diabetes. There is a need also to train the community health workers of this district to enable them to offer proper advice at the community level about diabetes prevention and management. The findings from this study could be used to assist in the planning of diabetes prevention and management programs in Rwamagana district.

Dedication

This work is dedicated to my dearly loved late mother Ancilla Nyiramana and to my brave father Felicien Rwamakuba. It is with immense pleasure that I also dedicate this work to my dearest sister Noëla Mukamana and brothers Emmanuel Twizelimana and Israel Ntakirutimana. Your love and patience helped me through all this Master's course and dissertation.

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Table of contents

List of tables

List of figures

List of abbreviations

ADA	American Diabetes Association
AIDS	Acquired Immunodeficiency Syndrome
CEA	Census Enumeration Areas
CHWs	Community health workers
CSA	Census Statistical Areas
CINAHL	Cumulative Index to Nursing and Allied Health Literature
DSHEA	Dietary Supplement and Health Education Act
FDA	Food and Drug Administration
GIMR	Garvan Institute of Medical Research
GTZ	Deutsche Gesellschaft fur Technische Zusammenarbeit
HbA1c	Glycosylated hemoglobin
HBM	Health Belief Model
HIV	Human Immunodeficiency Virus
IDF	International Diabetes Federation
IGT	Impaired glucose tolerance
MEDILINE	Medical Literature Online
RNDA	Rwanda National diabetic association
T2DM	Type 2 Diabetes Mellitus
WHO	World Health Organization
WOA	Wealth of Asia

Chapter 1
Introduction

1.1 Introduction and background

Diabetes mellitus is a condition in which the pancreas no longer produces enough insulin or cells stop responding to the insulin that is produced, so that glucose in the blood cannot be absorbed into the cells of the body; symptoms include frequent urination, lethargy, excessive thirst, and hunger (Diane, 2003).

Historically, the word diabetes dates from the time of Aretaeus, a physician of the second century AD; confronted with a patient exhibiting excessive urination, he chose Greek word, *diabetes* (meaning that which passes through), to define what he considered to be the dominant clinical sign in his patient. In 1670 Willis made a further distinction between patients with a sweet-tasting urine, (diabetes mellitus) and patients with polyuria without taste (diabetes insipidus) (Stanley, 2005).

Modern science recognizes three types of diabetes mellitus: type 1, type 2, and gestational diabetes mellitus, each presenting its own clinical manifestations (Davidson, 1998). Type 1 diabetes is most likely to be diagnosed in children and young adults; three out of four people with type 1 diabetes develop it before they turn 30 (Davidson, 1998 & Jones, 1998). But Type 1 diabetes may nonetheless be developed at any age (Beaser & Hill, 1995). Type 1 diabetes accounts for approximately 5-10% of diabetes cases (Perez & Cha, 2007). The most prevalent form of diabetes is Type 2 diabetes mellitus (T2DM). According to Libman and Arslanina (1999), T2DM accounts for about 90-95% of all diabetes cases.

T2DM is a serious public health concern. According to the International Diabetes Federation (IDF) (2009), an estimated 246 million people between the ages of 20 and 79 currently have

T2DM. The IDF also estimated that by 2025 almost 350 million people will have diabetes (Macaden, 2007).

T2DM is among the main causes of deaths worldwide. According to the World Diabetes Day report (2007), every ten seconds someone dies from T2DM-related causes and over 250 million people now have diabetes worldwide, a figure that is set to escalate to 380 million in the next generation if action is not taken. The World Health Organization (WHO) (2009), also reports that diabetes now ranks as the fourth main cause of death worldwide. Furthermore, Votey (2010) declared that T2DM is the major cause of blindness in adults aged 20-74 years, as well as the leading cause of nontraumatic lower-extremity amputation and end-stage renal diseases.

The big problem is public unawareness about T2DM. It is therefore difficult to establish the incidence and actual prevalence of T2DM due to the lack of awareness of the signs and symptoms among the general population. Some studies in Tehran and Bushehr indicated that approximately half of the diabetic population was not aware of their diseasee (Shirkani & Nabipour, 1999; Aosfoory et al., 1997; Wee, Ho & Li, 2002). The same authors observe that T2DM is a silent disease; many sufferers become aware that they have it only when they develop one of its life-threatening complications. Knowledge of T2DM can assist in early detection of the disease and reduce the incidence of complications. According to Macaden (2007), people who are most vulnerable to this chronic disease include those living in developing countries, and members of minority ethnic groups and socio-economically disadvantaged people in developed countries.

The WHO (2004), cited in the World Diabetes Day report (2007), asserted that the global increase in diabetes is triggered by, and associated with, many factors, including the ageing population, and the unhealthy diets and sedentary lifestyles that heighten one's propensity towards obesity; in the industrialized countries of the West, diabetes is common among the elderly, in contrast with developing countries where diabetes most frequently affects those between the ages of 35 and 64. It is important to note that the advent of HIV and AIDS brought an increase in opportunistic infections and a growth in the number of non-communicable diseases like diabetes and cancer, which largely explains the high prevalence of diabetes in the younger age group, which is still sexually active, in developing low-income countries.

In Rwanda, the estimated prevalence of diabetes in adults is 1.1%, amounting to 88,000 people out of 10,473,282 total population (IDF, 2009). This figure is however considered as an underestimate as diabetes is frequently undiagnosed in the country, and T2DM appears to be more common among the wealthier urban populations while type 1 is more frequent in rural areas (IDF, 2009). The IDF (2009) also stated that 33 children and adolescents with diabetes are known to be alive in Rwanda. Furthermore, Gishoma (2005) claims that diabetes has become a common disease in Rwanda, and is now the primary cause for consultation and the fifth cause for hospitalisation at the Kigali university hospital's endocrinology unit. The same author further declared that Rwanda expects an increase in cases of diabetes in the wake of a changed lifestyle characterized by overweight, unhealthy food and rising number of smokers. In addition, Ntambara (2008) argued that unless preventive measures are taken, diabetes prevalence in Rwanda is expected to double by 2030. This shows that diabetes in Rwanda is not a rare disease, but frequent and dangerous. Furthermore, diabetes has been addressed in health sector policy in Rwanda as the major concern for public health, hence the national initiatives by the Rwandan Government to fight diabetes (Health sector policy, 2005).

At the national level, the Rwandan government has established the Rwanda National Diabetic Association (RNDA) which runs one specialised diabetes clinic (Clinic Fraternité) located in the city centre of Kigali. More than 12,000 patients have been screened for diabetes at the clinic which has its own laboratory with an HbA1c machine; 5,861 patients with diabetes are currently registered at the clinic, receive treatment as well as education about diabetes self-management and prevention of complications. At the community level, the Rwandan Diabetic Association has established local diabetic associations in districts for patients to seek support regarding treatment, education and counselling (Gishoma, 2005).

Gishoma (2005) also notes, however, that in most cases there is a lack of insulin at the district hospitals, obliging patients who can afford to do so to purchase it from pharmacies. He also stresses that Rwandan diabetics are severely under-served in healthcare terms: it is estimated that Rwanda has one physician for every 30,000 people; currently, none of the medical centres in Rwanda is able to monitor levels of Glycosylated hemoglobin (HbA1c), a long-term indicator of blood glucose levels. Nyirahabineza (2005) warns that the excessive cost of insulin and diabetes supplies to people with the condition remains a major threat to the health of most people with diabetes in the country; furthermore, owing to frequent difficulties with

the distribution, storage, and transportation of medical supplies in Rwanda, pharmacies themselves often lack essential diabetes supplies. These problems are a legacy of the war and genocide which took place in Rwanda, destroying both people and property.

Rwanda also has community health workers (CHWs). According to Binagwaho (2009), Rwanda has set up a system where each village (100 to 150 households) elects two volunteers to act as CHWs for the general population; these two CHWs are then trained to monitor growth and development in children, care for people living with HIV, and refer sick patients to the nearest health facility. These health workers play a major role also in community health education.

However, the literature did not reflect any training program for the CHWs established by the RNDA to increase their knowledge about diabetes. The literature review (Gishoma, 2005; Ngabonziza, 2004; Ntambara, 2008; Nyirahabineza, 2005) also indicates that the responses concerning diabetes that are in place, such as education, counselling, treatments, and supplies, all target the known diabetic patients, with no provision for the general population (non-diabetic and diabetic). There are no strong policy guidelines to raise public awareness regarding diabetes, and there are no policies regarding diabetes detection at the primary care level; in most case the trained nurses are there to receive the "known diabetic patients", registered by the local diabetic association.

Gishoma (2005) reports that public education about the disease is confined to awareness workshops on diabetes prevention and diabetes self-management that the RNDA runs on radio and television. But many people do not have access to such media, especially in rural areas where the poverty is extreme. Nyirahabineza (2005) argues similarly that there is a lack of specific published information and training on diabetes for both the healthcare professionals and the general public in Rwanda.

Furthermore, Rwanda is still a developing country with poverty and ignorance in most rural areas (Nyirahabineza, 2005). Most Rwandans entertain myths and beliefs about diabetes as well as other diseases; most Rwandans continue to consult the traditional healers, as they believe in traditional medicine (Ntambara 2008). According to Ntambara, most Rwandans believe that their relatives have been bewitched when they start to develop diabetes-related obesity, and they bring them to traditional healers. Taylor (1992) argues in the same way that

Rwandans practice both Western and indigenous forms of health care, continuing to visit indigenous healers, who combine herbal medicines with spiritual cures.

These beliefs and the lack of adequate health education about diabetes may influence the level of knowledge of Rwandans about diabetes and create an obstacle to seeking medical assistance. By exploring the diabetes knowledge and perceptions of people in Rwamagana district, the study will highlight the areas of deficiency to be addressed in order for diabetes to be combated by prevention. Shafaee et al. (2008) assert that increasing public awareness of modifiable diabetes risk factors and healthier lifestyles are among the various possible mechanisms being used to stem the present epidemic of diabetes.

1.2 Problem statement

Reviewed literature shows that there is a worldwide increase in the number of deaths from T2DM-related complications (WHO, 2009; Votey, 2010; IDF, 2006; Roglic & Unwin, 2009). Jones, cited in the World Diabetes Day Report (2007,) asserted that T2DM-related deaths are likely to increase in the next 10 years if no urgent preventive interventions are put into place. It is therefore a concern that the majority of studies done in different countries have shown that most people are unaware of diabetes and its complications (Murugesan et al., 2007; Soltanian, Bahreini, Ardekani , 2007; Shafaee et al., 2008; Muninarayana, Balachandra, Hiremath ,Iyengar, and Anil ,2010).

While HIV/AIDS was the leading cause of death in Rwanda, there seems to be an increase in death rates related to non-communicable diseases such as T2DM (*Health sector policy,* 2005). Myths surrounding diabetes are common and are usually attributable to practices that have not been evaluated rigorously (Adler & Paauw, 2003). Most Rwandans still entertain myths and beliefs about diabetes as well as other diseases which mean that they turn first to traditional healers and delaying approaching the formal health care system (Taylor, 1992; Nyirahabineza, 2005; Ntambara, 2008). This is why the researcher considers it necessary to investigate knowledge and identify perceptions about T2DM among residents of Rwamagana district, in order to explore their level of knowledge about that disease. No study yet exists on

popular knowledge and perceptions of diabetes in Rwanda, prompting the researcher's interest to conduct the present investigation in Rwamagana district.

1.3 Aim of the study

The aim of the study is to explore the level of knowledge and perceptions of Type 2 Diabetes Mellitus among people in Rwamagana District.

1.4 Research questions

To achieve the aim, the study seeks to answer the following questions:

- What is the level of diabetes knowledge among the people of Rwamagana district?
- What are the people's perceptions regarding causes, complications and treatment of diabetes in Rwamagana district
- What is the extent of perceived risk of developing diabetes among people of Rwamagana district?
- What are the people's perceptions regarding diabetes prevalence, prevention and behaviour change in Rwamagana district?

1.5 Objectives

- To explore Rwamagana residents' level of knowledge of diabetes.
- To determine Rwamagana people's perceptions on causes, complications and treatment of diabetes.
- To explore the perceived risk of developing diabetes among Rwamagana residents

- To identify people's perceptions regarding diabetes prevalence, prevention and behaviour change in Rwamagana district.

1.6 Definition of concepts

Diabetes

In this study, *diabetes* refers to Type 2 Diabetes Mellitus (T2DM).

Knowledge

In this study, *knowledge* signifies understanding of the meaning, causes, risk factors, signs, complications, treatment and management of diabetes at the community level, and of methods of preventing diabetes.

Perceptions

In this study, *perceptions* refers to people's interpretations of causes, complications, and treatment of diabetes as well as their understanding of risk of developing this disease, participant's convictions regarding diabetes prevalence and prevention, and their perceptions regarding requisite behaviour change.

1.7 Significance of the study

Public knowledge about diabetes helps in combating not only the disease itself but also its complications and its medical and socio-economic consequences (Murugesan et al, 2007). A number of studies have, however, shown high levels of ignorance about the disease (Murugesan et al., 2007; Liaquat, 2006; Rafique, Azam and White, 2006).

This study has three major areas of significance:

Research

In accordance with the aims stated, this study will investigate the level of knowledge about T2DM in Rwamagana district and commonly held perceptions of the disease among the local public, thereby providing documentation on the public understanding of T2DM in Rwanda which will in turn provide a basis for further research.

Practice

This study will help health professionals to recognize public perceptions of T2DM and take these into consideration in their daily practice.

Education

This study can be used as reference material in nursing schools to train nursing students to acknowledge and be aware of ordinary people's perceptions regarding T2DM. It will help the Ministry of Health and diabetic associations in Rwanda to plan and carry out diabetes education programmes designed according to the level of people's knowledge about T2DM and the principal areas of deficiency in that knowledge.

1.8 Theoretical framework

A theoretical framework is defined by LoBiondo-Wood and Haber (1990) as a frame of reference for subsequent definitions of variables, research designs, interpretation, and generalizations. The Health Belief Model (HBM) will serve as a theoretical framework for this study. The HBM is a psychological model that attempts to explain and predict health behaviours by focusing on attitudes and beliefs of individuals. The HBM was developed in the 1950s as a part of effort by social psychologists in the United States Public Health Service to explain the lack of public participation in health screening and prevention programs (e.g., a free and conveniently-located tuberculosis screening project). Since then, the HBM has been adapted to explore a variety of long –and short term health behaviours, including sexual risk behaviours and the transmission of HIV-AIDS. The key variables of HBM are as follow (Rosenstock, Strecher & Becker, 1994):

- **Perceived Threat**: consists of two parts: perceived susceptibility and perceived severity of health condition.

- **Perceived Susceptibility**: One's subjective perception of the risk of contracting a health condition

- **Perceived Severity**: Feelings concerning the seriousness of contracting an illness or of leaving it untreated (including evaluations of both medical and clinical consequences and possible social consequences).

- **Perceived Benefits**: the believed effectiveness of strategies designed to reduce the threat of illness.

- **Perceived Barriers**: The potential negative consequences that may result from taking particular health actions including physical, psychological and financial demands.

- **Cues to Action**: Events, either bodily (e.g., physical symptoms of a health condition) or environmental (e.g., media publicity) that motivate people to take action. Cues to actions is an aspect of the HBM that has not been systematically studied.

Other variables: Diverse demographic, sociopsychological and structural variables that affect an individual's perceptions and thus indirectly influence health-related behaviour.

Self-Efficacy: Belief in being able to successfully execute the behaviour required to produce the desired outcomes.

Implications for Health Behaviours

HBM research has been used to explore a variety of health behaviours in diverse populations. For instance, researchers have applied the HBM to studies that attempt to explain and predict individual participation in programmes for influenza inoculations, high blood pressure screening, smoking cessation, seatbelt usage, exercise, nutrition, and breast self-examination. With the advent of HIV/AIDS, the model also has been used to gain a better understanding of sexual risk behaviours (Rosenstock et al., 1994).

In a literature review of all HBM studies published from 1974-1984, Glanz ,Lewis and Rimer (1997) identified cross-study designs and populations and perceived barriers as the most influential variables for predicting and explaining health-related behaviours.

Other significant HBM dimensions were perceived benefits and perceived susceptibility, with perceived severity identified as least significant variable. However, Bandura, cited by

Denison (1996), affirms that, more recently researchers are suggesting that an individual's perceived ability to successfully carry out a 'health" strategy, such as using a condom consistently, greatly influences his/her decision and ability to enact and sustain a changed behaviour

Health Belief Conceptual Model

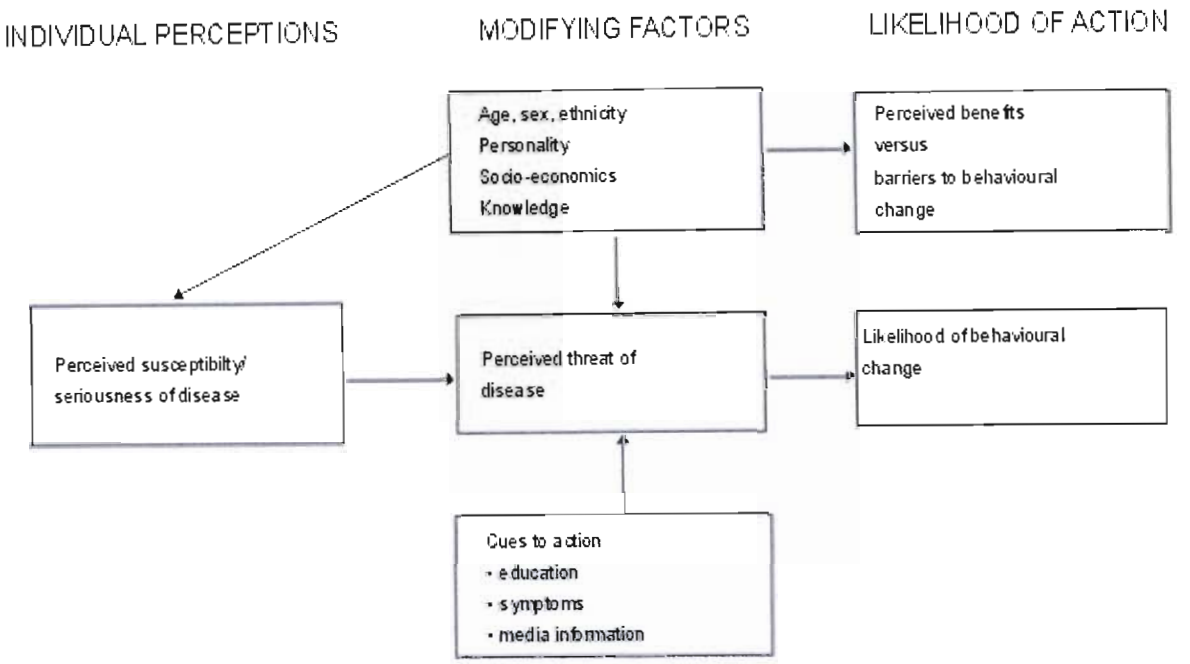

Figure 1-1: Belief Model (Glanz, Rimer and Lewis, 2002, p. 52)

The HBM suggests that the likelihood that an individual will take action concerning a health condition is determined by the person's desire to take action and by the perceived benefits of the action weighed against the perceived costs of barriers. The model shows how these individual perceptions can be influenced by modifying factors such us age, education, etc... It also evaluates how an individual estimates their susceptibility to develop a condition and the benefits of detection and treatment for that particular illness.

Scope and Application

The HBM has been applied to a broad range of health behaviours and subject populations. Two broad areas can be identified (Conner & Norman, 1996):

- Preventive health behaviours, which include health-promoting (e.g. diet, exercise) and health-risk (e.g. smoking) behaviours as well as vaccination and contraceptive practices.

- Sick role behaviours, which refer to compliance with recommended medical regimens, usually following professional diagnosis of illness.

The limitations of HBM

Denison (1996) lists the following as general limitations of HBM:

- Most HBM-based researches to date have incorporated only selected components of the HBM, thereby not testing the usefulness of the model as a whole.
- As a psychological model, it does not take into consideration other factors such as environmental or economic factors that may influence health behaviours.
- The model does not incorporate the influence of social norms and peer influences on people's decisions regarding their health behaviours (a point to consider especially, when working with adolescents on HIV issues).
- The model was done for developed countries with totally different economic, socio-cultural settings.

In this study, the Health Belief Model-based exploration of people's perceptions regarding the causes, complications, and treatment of diabetes, their perceptions of risk of developing this disease, and their perceptions regarding diabetes prevalence and prevention will bring to light their perceptions about susceptibility and severity of illness and also their perceptions about the benefits of diabetes-prevention methods such as regular exercise, eating a healthy low-fat diet and controlling weight to normal or near normal This will help the researcher to predict the health behaviour of people living in Rwamagana district in relation to diabetes prevention through healthy behaviour styles and early detection through regular diabetes screening. The knowledge will be adapted to the cues of change. Below are two tables showing the adaptation of this study to the Health Belief Model.

Table 1.1: Perceptions of diabetes – adapted to HBM

Concept	Definition	Operation definitions (prediction for this study)
Perceived susceptibility	Beliefs about the chances of getting a condition	Perceived risk of people of developing diabetes mellitus
Perceived severity	Beliefs about the seriousness of a condition and its consequences	Participants 'perceptions of diabetes's complications and its prevalence.
Perceived benefits	Beliefs about the effectiveness of taking action to reduce risk or seriousness	Participants' perceptions regarding the benefits of diabetes prevention.
Perceived barriers	Beliefs about the material and psychological costs of taking action	Participants' perceptions regarding the feasibility of diabetes prevention
Cues to action	Factors that activate "readiness to change"	Participants' levels of knowledge of diabetes (see table1.2), does their knowledge make them ready to the cues to action?. (e.g.: Do they know how to prevent diabetes?)

(Adapted from Glanz, Lewis, & Rimer, 1997)

Table 1.2: Knowledge levels about diabetes – adapted to HBM

Concept	level	Knowledge of people
1 Cue to action present	Level one	(i) Definition of diabetes (ii) Causes (iii) Risk factors (iv) Signs and symptoms (v) Treatment and management at the community level (vi) Prevention
2. High Potential for cue to action present	Level two	Half of the questions in level one answered
3 Less potential for cue to action present	Level three	Only two questions answered in level one
4. Cue to action absent	Level four	0 to 1 question answered in Level one

1.9. Conclusion

This chapter provided an introduction to the study, the background of the study, the problem statement, research questions, the aim and objectives as well as the significance of the study.

The researcher defined the key terms, discussed the theoretical framework with its adaptation to the study.

Chapter 2
Literature review

2.1 Introduction

According to Polit and Beck (2007), a literature review is necessary for comparing results of earlier findings in order to explore what further research would be necessary. This chapter has four sections. The first is a general overview of statistics with focus on prevalence of diabetes. The second section focuses on the description of T2DM and preventive measures against it. The third section considers the knowledge aspects of the way people regard diabetes, as documented in research findings, together with an attempt to describe people's perceptions regarding diabetes. The fourth section describes the care of diabetes in Rwanda with emphasis on primary health care principles.

As this study will be linked to other similar research, the findings will be understood within the existing base of people's knowledge and perceptions of diabetes. To put this study in perspective, the researcher searched for data on aspects of people's knowledge and perceptions about diabetes globally.

The literature search included the following computerized databases: MEDLINE (Medical Literature Online), Academic Search Premier, Nexus, EBSCOhost, and CINAHL (Cumulative Index to Nursing and Allied Health Literature). It also included as key words diabetes awareness among non-diabetics, knowledge about T2DM, and people's perceptions and beliefs about diabetes. A number of text books on the topic were also consulted.

2.2 Overview of T2DM statistics

Worldwide, the number of people with diabetes is increasing. In a global survey of the problem the World Health Organization indicated that this disease does not spare rich or poor, developed or non-developed populations (Takrouri, 2007). Wild et al. (2004) and Takrouri (2007) link this increase with population growth, aging, urbanization, increasing prevalence of obesity and physical inactivity, socioeconomic status, sex, genetic susceptibility, lifestyle and other environmental factors.

In the study done by Wild et al. (2004) it was found that the prevalence T2DM for all age-groups worldwide was estimated to be 2.8% in 2000 and 4.4% in 2030; the total number of people with this disease was projected to rise from 171 million in 2000 to 366 million in 2030. The prevalence of T2DM is higher in men than women; the urban population in developing countries is projected to double between 2000 and 2030 and the most important demographic change to diabetes prevalence across the world appears to be the increase in the proportion of people >65 years of age (Wild et al. 2004). Thévenod, Masur & Zänker (2008) calculated that the global figure of people with T2DM was set to rise from estimate of 150 to 220 million in 2010, and 300 million in 2025.

It is estimated that T2DM affects over six percent of the US population (some 18 million Americans), is the sixth leading cause of death in USA, and had an estimated health care cost of over $132 billion 2002 (Brandle et al., 2003). Rafique et al. (2006) discovered that with an overall prevalence of over 10% among the adult population of Pakistan, T2DM has become a serious health problem for the nation. An estimated 6.5 million people aged 25 years and above were affected with T2DM in Pakistan in 2006 and, if no intervention strategies are adopted, the WHO forecasts that the number will rise to 14.5 million by the year 2020 (Rafique et al. 2006).

In Canada, the Canadian Diabetes Association (2005) reports that more than 3 million Canadians have T2DM and this number is expected to reach 3.7 million by 2020; the dramatic is attributed to a number of factors such as the aging of population, rising obesity, and the increasingly sedentary lifestyles of Canadians.

A study by Dunstan et al. (2002) found that the prevalence of T2DM in Australia was 8.0% in men and 6.8% in women and they concluded that Australia has a rapidly rising prevalence of diabetes. This is consistent with the confirmation of Wild et al. (2004) that the prevalence of T2DM worldwide is higher in men than women.

According to Wang, McGreevey and Fu (2009), in China, more than 23 million people currently have T2DM, and that number is expected to almost double in 20 years. Between 1996 and 2006, diabetes prevalence increased rapidly in Chinese cities, from 4.6 percent to 7.7 percent, particularly in the largest cities (Wang et al. 2009).

T2DM is a major threat in developing countries too. According to Narayan et al. (2006), in 2003 194 million people 20 to 79 years of age had T2DM, almost three-quarters of them living in the developing world By 2025 this number will have increased by 72%: 333 million cases are predicted, with a doubling of the prevalence in the Middle East, North Africa, South Asia and Sub-Saharan Africa. Almost 1 million people die because of T2DM each year; two-thirds of these in developing countries (Narayan et al. 2006). The IDF (2009) confirms that in developing countries, diabetes affects at least 80 million people between ages 40 and 59.

Tsiko (2006) noted that T2DM is a major health problem in Africa. The WHO (2009) estimated that seven million Africans suffer from this disease. In addition, Motala, Omar and Pirie (2003) note that a recent review found that the prevalence T2DM in Africa has increased over the past decade, with reported rates varying from low (in some rural areas) to moderate (some countries in North and North East Africa and South Africa) and high (among urban communities in Cairo and populations of mixed Egyptian ancestry in Northern Sudan).

According to Rheeder (2006), data from South Africa disclosed that the greatest prevalence was found in the Indian community of Durban (13%) and the elderly Coloured community of Cape Town (28.7%). Furthermore, the International Diabetes Federation Diabetes Atlas reported a prevalence figure of 3.4% for the 24 million South Africans between the ages of 20 and 79, with an expected increase to 3.9% by 2025 (Rheeder, 2006).

In addition to the rise in T2DM prevalence in both developed and developing countries, this disease causes many deaths worldwide. T2DM was expected to cause 3.8 million deaths worldwide in 2007, roughly 6% of total world mortality, which is about the same as HIV/AIDS and malaria combined. Using WHO figures on years of life lost per person dying

of T2DM, the IDF translates these figures into more than 25 million years of lost life each year (IDF, 2006). The IDF (2006) estimates that the equivalent of an additional 23 million years of life are lost each year to the disability and reduced quality of life caused by T2DM complications. Furthermore, the WHO (2009) asserts that T2DM is now ranked as the fourth leading cause of global death by disease.

Additionally, in a study done by Roglic & Unwin (2009) it was revealed that the total number of excess deaths attributable to T2DM worldwide was estimated to be 3.96 million in the age group 20–79 years, 6.8% of global (all ages) mortality.

Some authors have related the increase in T2DM and its associated complications to lack of knowledge about T2DM among the general populace, especially lack of knowledge about risk factors for T2DM and its prevention methods (Murugesan et al., 2007; Soltanian et al.,2007; Shafaee et al. 2008; Muninarayana et al. 2010). In their study done in Pakistan, Sabri, Qayyum, Saigol, Zafar and Aslam ((2007) have shown that most people are unaware of T2DM and its complications; hence most of them consult the hospital at the last stage of the disease with complications. Nisar, Khan, Qadri, and Sher (2007) conducted a study in Gadap town, Karachi, and discovered that people's awareness of T2DM was affected by myths, misconceptions and beliefs surrounding the disease. Furthermore Adler and Paauw (2003) asserted that myths surrounding diabetes are common and are usually attributable to practices that have not been evaluated rigorously.

2.3 Description of T2DM

2.3.1 Meaning

Diabetes mellitus is a metabolic disorder caused by the body's inability to produce or process glucose which the body uses for energy. In some diabetic patients, the pancreas produces little or no insulin; in other cases body cells may not respond adequately or use appropriate amounts of insulin that are produced by the body. Insulin is a hormone which converts sugar and starches into energy for the body to use (American Diabetes Association (ADA), 2004; Mathews, 2003).

The most common form of diabetes mellitus, Type 2, occurs when the pancreas produces limited amounts of insulin or the cells are resistant to insulin action (ADA, 2004). Type 2 diabetes mellitus (T2DM) is a chronic, debilitating and costly disease associated with severe complications, and has been recognised as such by the United Nations (Matthaei, Mnuro & Zinman, 2007). According to Ligaray (2010) Type 2 diabetes mellitus is a group of disorders characterized by hyperglycemia and associated with microvascular (retinal, renal, possibly neuropathic), macrovascular (coronary, peripheral vascular), and neuropathic (autonomic, peripheral) complications.

T2DM is related to age, family history, physical inactivity and ethnicity. About 80% of people with T2DM are overweight or obese (Mathews, 2003). This type of diabetes accounts for about 90-95% of all diabetes cases (Libman & Arslanina, 1999).

T2DM is considered a milder form of diabetes because of its slow onset (sometimes developing over the course of several years) and because it usually can be controlled with diet and oral medication. The consequences of uncontrolled and untreated T2DM diabetes, however, are the just as serious as those for T1DM (Mangyan, 2008).

2.3.2 Causes

According to Knowler, Connor and Fowler (2002), T2DM occurs when the pancreas (an organ in the abdomen) produces insufficient amounts of the hormone insulin and/or the body's tissues become resistant to normal or even high levels of insulin. In addition, Mathur (2010) confirms that insufficient production of insulin (either absolutely or relative to the body's needs), production of defective insulin (which is uncommon), or the inability of cells to use insulin properly and efficiently leads to hyperglycemia and diabetes.

Knowler et al. (2002) related the insulin deficiency to a complex interaction of environmental factors and predisposing genetic factors: genetic causes, environmental conditions and pregnancy. Ferry (2008) too related T2DM to genetic links, emphasizing that this form of diabetes tends to run in families. The link between T2DM and genetic factors has also been made by a number of other authors (Gerich, 1998; Votey, 2010; Shai, Jiang and Manson 2006; Rother, 2007).

Ferry (2008), Tuomilehto et al. (2001) and McCulloch and Robertson (2010) have added further risk factors such as high blood pressure, high blood triglyceride (fat) levels, high-fat diet, high alcohol intake, sedentary lifestyle, obesity or being overweight, and aging.

2.3.3 Signs and symptoms

Symptoms of T2DM can begin so gradually that a person may not know that he or she has it. Early signs are lethargy, extreme thirst (polydipsia), and frequent urination (polyuria); other symptoms may include sudden weight loss (emaciation), slow wound healing, urinary tract infections, gum disease, blurred vision and altered mental status, increased hunger (polyphagia), fatigue, and areas of darkened skin (Ferry, 2008; Launer, 2009; Harris, 2002).

It is not unusual for T2DM to be detected while a patient is seeing a doctor about another health concern that is actually being caused by the yet undiagnosed diabetes.

2.3.4 Complications

According to Ferry (2008), Jenkins et al. (2008) and ADA (2004), both forms of diabetes ultimately lead to high blood sugar levels, a condition called hyperglycemia. Over a long period of time, hyperglycemia damages the retina of the eye, the kidneys, the nerves, and the blood vessels; diabetes accelerates atherosclerosis, (the formation of fatty plaques inside the arteries), which can lead to blockages or a clot (thrombus). Such changes can then lead to heart attack, stroke, and decreased circulation in the arms and legs (peripheral vascular disease). The disease also predisposes people to high blood pressure and high cholesterol and triglyceride levels. According to Jenkins et al. (2008) in the short run, T2DM can contribute to a number of acute (short-lived) medical problems such as many infections, hypoglycaemia, diabetic ketoacidosis, and hyperosmolar hyperglycemic nonketotic syndrome.

Besides significant mortality and diabetes-related morbidities, diabetes has also placed a heavy financial burden on society; for example, in the United States alone, the total annual economic cost of diabetes in 1997 was estimated to be US$98 billion; this included US$44 billion in direct medical and treatment costs and US$54 billion for indirect costs attributed to disability and mortality (Wee, Ho & Li, 2002).

2.3.5 Diabetes prevention

According to Younis, Soran, and Farook (2004), lifestyle changes and pharmacological agents play an important role in T2DM prevention. The same authors further declared that lifestyle modifications with weight loss and moderate exercise can reduce the incidence of T2DM by >50% in patients with impaired glucose tolerance (IGT), and that the use of pharmacological intervention with use of drugs such as metformin and acarbose can prevent progression of IGT to T2DM, However their cost-effectiveness and long-term safety are largely unknown. Also Ferry (2008) argues in the same way that T2DM can be prevented in some cases by controlling weight to normal or near-normal levels, by eating a healthy low-fat, high-fibre diet, by doing regular exercise diabetes, by keeping alcohol consumption low, and by stopping smoking.

2.4 Knowledge about T2DM among the general public

Most studies in developing or industrialised countries have shown that most people are not aware of T2DM and its complications. Tessaro, Smith and Rye (2005) found that in West Virginia there is lack of public knowledge about T2DM before and after diagnosis; cultural and economic factors were found to be barriers to early detection of this disease as well as the care and education of those diagnosed. Shafaee, et al. (2008) demonstrated that there is lack of awareness of major risk factors for T2DM in the semi-urban Omani population; their study was carried out in two semi-urban localities and a total of 563 adult residents were interviewed. Knowledge of T2DM was suboptimal; the percentages of correct responses to questions on diabetes definition, classical symptoms, and complications were 46.5%, 57.0%, and 55.1%, respectively. Only 29.5%, 20.8% and 16.9% identified obesity, physical inactivity and a positive family history, respectively, as risk factors for T2DM.

Kiawi et al. (2006) found likewise that awareness of T2DM and knowledge of its causes, clinical course, and complications were limited among urban residents in Cameroon. Furthermore, in the study done by Muninarayana et al. (2010) 75% of 311 people interviewed were not aware of the long-term effects of T2DM or of diabetic care in rural Tamaka and Kolar (India); in this study, knowledge about complications of T2DM was even poorer.

However, the study done by Wee, Ho and Li (2002) in Singapore found that the respondents' knowledge of T2DM was at an acceptable level except few areas of deficiency. According to these authors, the relatively large proportion of respondents with tertiary education may be contributing factor to that high average score.

In the literature reviewed, there are studies which have found that diabetic persons are more aware of T2DM. In the study by Yun et al. (2007) the results showed that patients with T2DM were significantly more knowledgeable than the healthy volunteers about risk factors, symptoms, chronic complications, treatment and self-management, and monitoring parameters. Murugesan et al. (2007) reported that knowledge regarding causes of T2DM, its prevention and the methods to improve health was significantly low among the general population while diabetic subjects had better knowledge about symptoms of diabetes and the preventive aspects.

On the other hand, the study by Sircar , Sircar , Sircar and Misra (2009) showed that among patients of poorly-controlled T2DM and their close family members there was a gross lack of knowledge of complications of diabetes, causes of obesity, treatment of diabetes, and use of insulin.

Other studies have found that there are many people who already have diabetes and are unaware of their diagnosis. Soltanian et al. (2007) pointed out that among the inhabitants of the port city of Bushehr (Iran) approximately half the people with T2DM (estimated to be around 1.5 Million) were undiagnosed and thus unaware that they had the disease. The same authors further noted that this lack of awareness can lead to presentation with complications and its consequences. ADA (2010) reported that while approximately 23.6 million Americans have diabetes, as many as 50% are unaware that they have the disease.

In their study conducted in South Africa, Hughes & Bradley (2006) indicated that Community Health Workers (CHWs), lay personnel employed to serve as a link between professional healthcare staff and the community, can be a powerful force for T2DM prevention and adherence to treatment regimens in the communities given appropriate knowledge; the big issue is that even CHWs did not have the requisite knowledge, attitudes and beliefs to make a positive impact on prevention and management of T2DM.

The literature suggests that lack of knowledge about T2DM is not only a barrier to the early detection of that disease, but also the cause of poor self-management of diabetic persons, which is the key element in T2DM management.

2.5 Popular perceptions about diabetes

People have various perceptions and beliefs regarding the causal factors, complications and therapeutics issues of T2DM. These perceptions may be classified in three categories:

***2.5.1. Perceptions of causal factors and High risk*:** Most people recognize T2DM as a genetic disease. Pijl et al. (2009) discovered that the role of genetics as a cause for T2DM was more pronounced when people perceived diabetes as "running in the family," and the absence of this disease in the family was often used as a reason to perceive a low risk. Most of the participants without a family history perceived a low risk of developing T2DM, only a few (3/12) perceived themselves at a slightly higher risk than average because they considered themselves to be overweight and having an unhealthy lifestyle.

However Pijil et al. (2009) asserted that even participants with T2DM in their family did not seem to associate this information with their own risk; only 4 of 9 participants with a positive family history perceived a slightly higher risk because of the T2DM in their family when comparing themselves with other people of the same age. Other causal factors perceived by the participants in the same study (Pijil et al. 2009) were behavioural causes such as unhealthy food (too much fat and sugar, unvaried diet), lack of physical activity, stress, alcohol intake, and age.

Greenhalgh & Helman (1998) found that etiological factors of T2DM mentioned by the participants included heredity (the notion of an agent transmitted through "shared blood" rather than an inherited predisposition) and germs, and many informants mentioned physical or psychological stress – either as a perceived cause of diabetes or simply when reporting the experience of daily life especially in relation to economic difficulties and poverty. Debussche et al. (2006) confirmed that the perceived causal factors of T2DM among participants were mainly sugar excess, heredity and stress or life events, not weight excess and lack of physical activity.

Skelly, et al. (2006) found that common themes included diabetes "running in families", "eating too much sugar", and "not taking care of yourself" as causes of T2DM among participants of their study; weight and physical activity or exercise were not seen as contributing to the development of T2DM, and participants were not sure if diabetes could be prevented.

On the other hand, for some people T2DM was attributed generally to events or agents outside the body rather than to primary failure of an organ within it. Factors such as God's will, pollution in the environment, and poor medical care in the past were cited by participants as causes of T2D in the study by Greenhalgh and Helman (1998).

Barnes, Morris and Kaufusi (2004) found that Tongan patients perceived factors such as God's will, pollution in the environment, and poor medical care in the past as causes of T2DM. According to these authors, the beliefs that characterised the Tongan patients tended to be associated with poorer adherence to diet and medication taking.

Sowattanangoon, Kotchabhakdi and Petrie (2009) found that some patients explained the cause of their illness as being due to cultural factors such as karma (actions) from either previous or current lifetimes. The law of Karma, or cause and effect, means that there are inescapable results of one's own actions; thus much of what one experiences is the result of one's own previous karma as a result of karma in a past life. Several patients believed that diabetes is a karma illness (Sowattanangoon et al., 2009).

2.5.2. Perceptions of Diabetes complications and its seriousness

Diabetes is a synonym of death and uncontrolled disease for most people. In the study by Kathryn et al. (2004), done in American women, the women presented a fatalistic view of diabetes, regarding the disease as an inevitable event that destroys health and ultimately results in death. Similarly, Debussche et al. (2006) found that diabetes was predominantly perceived among participants as potentially acute, with risk of coma and death; its chronic and progressive nature was not appreciated, and chronic complications were not well understood, especially in poorly educated people. In addition, Yun et al. (2007) found that the non-diabetics as well as diabetic participants perceived T2DM as a very cruel disease, related to many complications including coma and death.

However, there are other people who consider diabetes as simply a sickness of old people. Lamont (2002) found that some of participants in her study perceived T2DM as less frightening than other diseases, for example cancer. According to Lamont (2002), perceptions about T2DM among participants were influenced by several personal factors; firstly what is known and understood about T2DM, and secondly the strategies people use to deal with T2DM or the potential to develop T2DM.

2.5.3. Perceptions of therapeutical issues

Perceptions of therapeutical issues about T2DM vary from culture to culture. According to Kishore (2009), some participants asserted that T2DM is cured by spiritual treatment, since for them the disease is a result of past sins of people who contract it.

Deatcher (2006) suggested that prayer cures diabetes for the believers in God. This author reported a small and unpublished study of nine participants with Type 2 diabetes who used the prayer wheel for three months in addition to their usual self-care, Glycosylated hemoglobin (HbA1c) values were measured both before and after this three-month period and compared with the HbA1c values of a similar group of nine people with Type 2 diabetes who were not involved in the study; seven experienced a drop in HbA1c levels during the study period, with the drop in HbA1c averaging 0.9%. The other two participants experienced an average increase of 0.4%. In the control group, five people experienced an average drop of 0.5% in HbA1c, and four people experienced an average increase in HbA1c of 0.8%. According to Deatcher although this study was very small, the results suggest that the use of prayer, when combined with other holistic approaches to diabetes self-management, may have beneficial effects on one's HbA1c.

Similarly, Gregory (2008) postulated that praying and fasting may cure diabetes, especially T2DM. He argued that spiritual fasting is denying the body food for a spiritual purpose; it should never harm the body, but rather provide health to the body, the soul and the spirit. Another popular spiritual practice, namely Yoga, is considered to be a powerful resource for saving people from many life-threatening diseases like diabetes (Web Alliance, 2010).

Herbal medicines are also perceived by some people as cures for diabetes. According to Kishore (2009), 12.1% out of 124 diabetic's participants were taking herbal medicines. Rafique et al. (2006) argue that the use of traditional remedies is prevalent in many cultures; in the Indian subcontinent traditional medicines play an important role in diabetes care and a

number of plants, herbs and vegetables are used therapeutically – among these is bitter gourd (M. charantia) which is widely used as an alternative therapy for T2DM . According to *Wealth of Asia* (*WOA*) (1997), tribals in Madhya Pradesh use many herbs to cure diabetes. Garvan Institute of Medical Research (GIMR) (2006) reported that most Chinese people also use herbal medicine to cure their disorders, including T2DM, and the most often used herbal medicine for diabetes in China is Berberine .

These traditional herbal medicines are considered by some people as effective. According to *Herbal medicine for diabetes* (2007), since antiquity T2DM has been treated with plant medicines; recent scientific investigation has confirmed the efficacy of many of these preparations, some of which are remarkably effective, among them *Pterocarpus marsupium* (Indian Kino, Malabar Kino, Pitasara, Venga), Bitter Melon (*Momordica charantia*), *Gymnema sylvestre* (Gurmar, Meshasringi, Cherukurinja), Onion and Garlic (*Allium cepa* and *Allium sativum*), Fenugreek (*Trigonella foenum-graecum*) and Asian Ginseng.

According to *Natural and herbal cure for diabetes herbal treatment* (2009), ayurveda is a combination of natural anti-diabetic herbs that has been recommended for more than 5000 years. This is an herbal supplement which helps to correct the effects as well as the condition itself; it helps to combat various factors which precipitate the diabetic condition, and corrects the degenerative complications which results from T2DM.

However, these herbal medicines may have negative consequences and side effects. According to Covington (2001), it is important to recognize that data on drug-herb interactions are scarce, and there are clear contraindications to the use of specific herbs in certain populations, such as pregnant women, and discontinuing conventional medications in favour of herbal formulations may lead to serious complications such as significant hyperglycemia; combining conventional hypoglycemic agents with herbal preparations without proper monitoring could lead to hypoglycemia.

Covington (2001) also draws attention to the fact that because the Food and Drug Administration (FDA) does not regulate herbs, minerals, animal products, and patent formulas that come into the United States from China (herbal products being considered dietary supplements in terms of the Dietary Supplement and Health Education Act (DSHEA) of 1994), manufacturers do not need FDA approval or evaluation of such products regarding safety, purity, and efficacy before bringing their products to market; there have consequently

been reports of some formulas imported from China containing heavy metals such as lead and mercury and of others being deliberately adulterated with conventional Western pharmaceuticals, such as corticosteroids, anti-inflammatory agents, and benzodiazepines. Furthermore, traditional drugs used to address blood sugar levels have also been cited as increasing cholesterol and triglyceride in the body and having caused significant weight gain. Other side-effects reported include nausea, stomach and intestinal pain, diarrhoea, headaches, and fatigue (*Herbal medicine for diabetes*, 2007).

2.6 Diabetes care in Rwanda with focus on primary health care

Since 1995 Rwanda had in place a district health system with a primary health care model. The district health offices are responsible for the health needs of the population in that area and for the health facilities and services, whether provided by the government or by the private sector (*Overview of health system in Rwanda*, 2003).

The primary health care delivery in Rwanda is structured as follows:

- Agglomerations: 2 community health workers
- Cells: Health community posts
- Sectors: Health centres
- Districts: district hospitals
- Provincial: tertiary hospitals

According to Sekabaraga (2007), the priority interventions of primary health care services in Rwanda include: increasing the use of family planning methods; investment in strong prevention interventions for major diseases; universal access to curative treatment for all people living in Rwanda through universal coverage of health insurance; improvement of quality of care through quality of training; investment in infrastructure, drugs management, equipment and performance-based financing of providers; decentralization of health services at Umudugudu (health post) level and households level (community health workers) and mobilization of financial resources.

However, primary health care in Rwanda faces a number of challenges: quality of care, especially at the level of health centres where qualified health workers are very few; brain drain of human resources for health; high levels of poverty as a vicious circle in health status; lack of resources for infrastructure and equipment; poor transport and communication systems for emergencies; and off-budget issues with many implementers and difficulties of alignment and harmonization (Sekabaraga, 2007).

These challenges faced by primary health care in Rwanda, in particular the high level of poverty combined with the high child mortality and maternal mortality, constitute a barrier to Rwanda's achievement of the millennium goal development. It is also important to note that in Rwanda, the most people in rural areas still face a problem of safe water.

Rwamasirabo (2008) argues, however, that Rwanda has made important improvements in achieving gender equity in empowerment of women, and in prevention of major diseases like malaria and HIV/AIDS through distribution of antiretrovirals.

Care of diabetic patients in Rwanda follows the primary health care model. There is a local diabetic association at each district level and every diabetic in the district is registered. Treatment, education and other services for diabetic patients are offered primarily at health centres where two nurses have been trained in the care of diabetics; when the case is very serious referral is done from the health centre to the district hospital where the patient meets a trained doctor; if the referral is necessary the doctor can refer the patient to the clinic 'Fraternite" in Kigali where he/she can be seen by a specialist (Gishoma, 2006).

However, as mentioned earlier, insulin in Rwanda is costly and most diabetic are poor, which hinders the affordability of the medicine; in addition the pharmacies from which diabetics can purchase insulin are situated in the capital, far from the rural areas, obstructing the accessibility of care. Furthermore, Gishoma (2005) points out, severe financial constraints sometimes mean that neither hospitals nor pharmacies have supplies of insulin, drasticcall affecting the availability of diabetic care in the country. The excessive cost of insulin and diabetes supplies is a major threat to the health of most people with diabetes in Rwanda. Gishoma also notes that the withdrawal by the pharmaceutical companies of animal insulin and the introduction of more expensive human insulins exacerbates this threat: a vial of human insulin 100 U/ml costs around 15.0 EUR, the equivalent of the average person's income for two weeks. As a result, many people who should be taking carefully managed

doses of insulin are forced to use inappropriate medication or seek care from traditional healers. Both of these care options invariably result in appalling consequence (Gishoma, 2005).

Regarding the effectiveness and efficiency of diabetic care in Rwanda, the challenges are still many – when, as Gishoma (2005) points out, there are still no more than two trained nurses for each health centre, when the insulin and equipment are lacking even in hospitals and pharmacies, when there is only one trained doctor in a district hospital, when there is not a single medical centre in Rwanda able to monitor HbA1c levels (a long-term measurement of blood glucose levels). According to the IDF (2009), among the many problems identified during a preliminary survey on diabetes care in Rwanda are lack of health care professionals, lack of diabetes training, and difficulty in accessing diabetes care and medication (e.g., insulin and other diabetes supplies).

2.7 Conclusion

This literature global review was conducted to gain insight into the level of knowledge ordinary people have about causes of T2DM, its signs and symptoms, its complications, and prevention methods. It also discussed people's perceptions of causal factors, complications and therapeutical issues relating to T2DM. An overview of T2DM statistics has been included in this literature review. The literature also covered the care of diabetes in Rwanda with a focus on primary health care.

The reviewed literature shows that there is increasing T2DM prevalence worldwide; it also shows that this disease is a major health threat associated with many complications, and is a major cause of death in both developed and developing countries. The risk factors associated with high T2DM prevalence consist of a complex interaction of environmental factors and predisposing genetic factors. The literature review has also demonstrated that most people are unaware of T2DM; people lack knowledge about T2DM and studies have demonstrated that people have a variety of perceptions regarding the causes, complications and treatment of T2DM. In addition, the literature review reveals that some authors link lack of knowledge about T2DM with the increasing number of diabetics and of T2DM complications.

Chapter 3
Methodology

3.1 Introduction

Burns and Grove (2007) define research methodology as the application of all the steps, strategies and procedures for gathering and analysing data in a research investigation in a logical and systematic way. The purpose of this study is to determine popular knowledge and perceptions of T2DM among people in Rwamagana district.

In this chapter the researcher describes the research paradigm, research design and methodology that have been used in the study, which includes population, data-collection procedure, validity and reliability, and ethical considerations.

3.2 Research paradigm

According to Williams (1998), a paradigm provides a conceptual framework for seeing and making sense of the social world. According to Burrell and Morgan, cited by Williams (1998), to be located in a particular paradigm is to view the world in a particular way. The significance of paradigms is that they shape how we perceive the world and are reinforced by those around us, the community of practitioners. Within the research process the beliefs a researcher holds will be reflected in the way the research is designed, how data is both collected and analysed, and how research results are presented; thus it is very important for the researchers to recognise their paradigm as it allows them to identify their role in the research process, determine the course of any research project and distinguish other perspectives (Williams, 1998).

Denzin and Lincoln (2001) explain that the term *paradigm* encompasses three levels: the philosophical level (basic beliefs about the world we live in), the social level (where guidelines exist as to how researchers should conduct their endeavours), and the technical level (the methods and techniques ideally adopted when conducting research).

Positivism has been used as a paradigm in this study. The positivist paradigm of exploring social reality is based on the philosophical ideas of the French philosopher August Comte, who emphasized observation and reason as means of understanding human behaviour; according to him, true knowledge is based on experience of senses and can be obtained by observation and experiment (Cohen, Manion & Keith, 2000).

The assumptions of positivism, as Cohen et al. (2000) noted, are determinism, empiricism, parsimony, and generality. **Determinism** means that events are caused by other circumstances; and hence, understanding such casual links is necessary for prediction and control. **Empiricism** means collection of verifiable empirical evidences in support of theories or hypotheses. **Parsimony** refers to the explanation of the phenomena in the most economical way possible. **Generality** is the process of generalizing the observation of the particular phenomenon to the world at large. With these assumptions of science, the ultimate goal of science is to integrate and systematise findings into a meaningful pattern or theory which is regarded as tentative and not the ultimate truth; theory is subject to revision or modification as new evidence is found. The positivistic paradigm thus systematizes the knowledge-generation process with the help of quantification, which is essentially to enhance precision in the description of parameters and the discernment of the relationship among them (Cohen et al. 2000).

3.3 Research design

A research design is an overall plan for obtaining answers to research questions (Polit & Beck 2008). A design specifies the logical structure and the plan to be followed in the execution of a study (Sim & Wright 2000). The design specifies what variables or entities to examine, under what conditions to examine them, what type of data to collect, from whom

and at what time to collect the data, what methods to employ for data collection, and what implications ensue for subsequent data analysis (Sim & Wright 2000).

For this study, a non-experimental descriptive design has been adopted. The research approach was quantitative in nature. Burns and Grove (2005) describe quantitative research as a formal, objective, systematic process in which numerical data are used to obtain information about the world. Quantitative research can be descriptive, explorative, correlation, quasi-experimental or experimental (Burns & Grove 2005). This study was exploratory-descriptive in nature.

3.3.1 Exploratory

The word *exploratory* indicates that not much is known, which means that a survey of the literature failed to reveal any significant research in the area; hence, you cannot build on the work of others; you must explore the topic for yourself (Wood & Kerr, 2010). Burns and Grove (2005) assert that this type of research design is used to generate new knowledge about concepts or topics on which limited or no research has been conducted. No study has been done in Rwanda to explore people's knowledge and perceptions of diabetes; therefore the current study attempted to explore people's knowledge and perceptions of diabetes mellitus in Rwamagana District.

3.3.2 Descriptive

The purpose of descriptive research is to describe phenomena in real-life situations. Through descriptive research, concepts are described and relationships identified (Burns & Grove 2005). In this study, the people's perceptions of diabetes were described and the relationships between the elements of knowledge and socio-demographic factors were explored.

3.4 Design validity

3.4.1 Internal validity

Burns and Grove (2005) describe internal validity as the extent to which the study findings reflect the reality rather than the results of extraneous variables. The researcher tried to

control the internal validity by avoiding the use of ambiguous and complicated words in data collection tools. Easily understood words were used and the questionnaire was translated into the local language. The questions were designed to cover people's knowledge and perceptions of diabetes to make sure that they measure what the researcher intended to measure. The researcher also avoided selection bias by randomly selecting the participants in the study.

3.4.2 External validity

External validity is achieved when results can be generalized to situations outside the specific research setting (Polit & Hungler, 1999; Fisher & Foreit, 2002). Polit and Beck (2008) maintained that a study is externally valid to the extent that the sample is representative of the broader population and the study setting. In this study, measures have been taken to increase external validity by selecting a representative sample size (using Raosoft calculator, 2004) from the sampling frame, and the researcher made sure that the participants were from the study area by using research assistants from the study area who knew the place well. The research assistants were trained before data collection.

3.5 Research Setting

Kigabiro sector was the setting of this research. Kigabiro sector is one of 14 sectors of Rwamagana District. Rwamagana District is one of six Eastern provinces; it is divided into 14 sectors (*imirenge*): Fumbwe, Gahengeri, Gishari, Karenge, Kigabiro, Muhazi, Munyaga, Munyiginya, Musha, Muyumbu, Mwulire, Nyakariro, Nzige and Rubona (*Rwanda's Eastern province*). And Kigabiro sector is divided into five cellules (known as *Utugari*): Cyanya, Nyagasenyi, Bwiza, Sovu and Sibagire. Below is the Rwamagana district map:

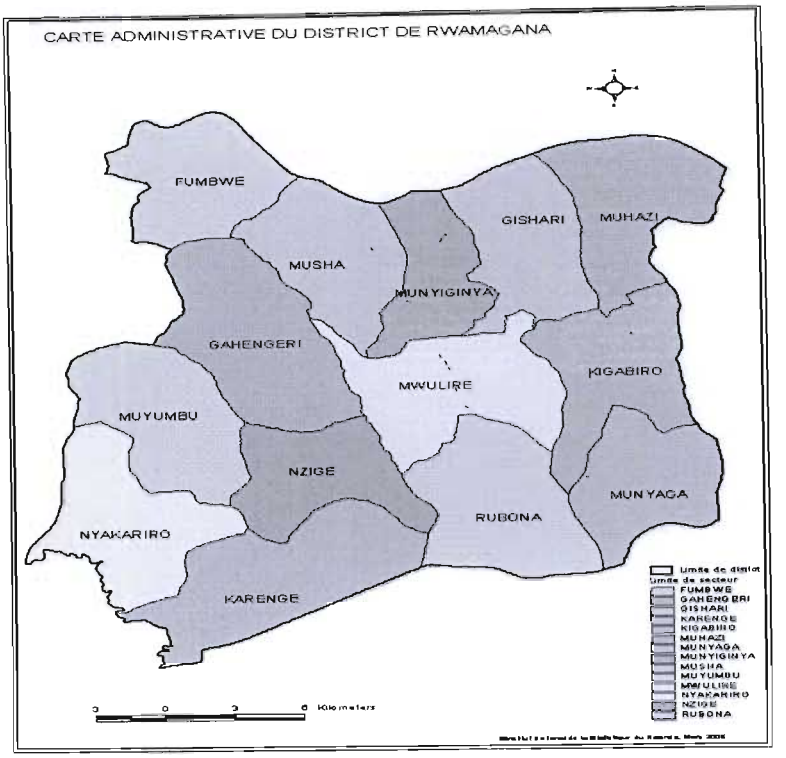

Figure 3-1: Map of Rwamagana district

Source:http://www.maplandia.com/rwanda/kibungu/rutonde/rwamagana/

3.6 The population

A *population* refers to the entire group of people, events or things of interest that the researcher wishes to investigate (Sekaran, 2003). The population for this study comprised all people (women and men aged between 15 and 65) living in a sampled sector of Kigabiro. The researcher used the available 2006 statistics to identify the total number of people living in Kigabiro sector. According to a decentralization report by the Deutsche Gesellschaft fur Technische Zusammenarbeit (GTZ) (2006), 4556 people between the ages of 15 and 65 were living in Kigabiro sector. This number represents the total target population in this study.

3.7 Sample and Sampling

A sample consists of a subset of the units that comprise the population. It is the proportion of subjects selected from the accessible population from whom information for the study is obtained; a sample should be representative of the population from which it is selected (Babbie & Mouton, 2001). In this study, the sample consisted of the selected people from Kigabiro sector who meet the eligibility criteria.

In order to be included in the study, the respondents had to be

- residents of the study area
- aged 18 years or more
- found at home during the study period

3.7.1 Sampling

Sampling is defined as the process of selecting a portion of the population to represent the entire population so that inferences about the population can be made (Polit & Beck, 2008). Researchers rarely survey the entire population, for two reasons (Adèr, Mellenbergh, & Hand, 2008): the cost is too high, and the population is dynamic in that the individuals making up the population may change over time. The three main advantages of sampling are that the cost is lower, data collection is faster, and since the data set is smaller is possible to ensure homogeneity and improve the accuracy and quality of the data (Ader et al., 2008). To this effect, this study utilized a cluster multistage sampling technique to come up with a representative sample. Cluster multistage sampling involves the inclusion of purposive and random probability sampling techniques, looking at various stages (Burns & Grove, 2005).

The following stages have been adopted:

Stage One: Sampling of Provinces:

There are five provinces in Rwanda: Northern, Southern, Eastern, Western and Kigali. One of the provinces (Eastern Province) was randomly selected using the fishbowl technique as follows: the researcher wrote the name of each province on a separate piece of paper, put the pieces into the bowl and with closed eyes selected one piece.

Second Stage: Sampling for District

Names of all six districts in the Eastern province (Bugesera, Gatsibo, Kayonza, Kirehe, Ngoma, Nyagatare and Rwamagana) were written down to come up with a sampling frame. A simple random sampling technique was used to select one district (Rwamagana). Names of all districts were assigned numbers (1-6). These numbers were written down on sheets of paper, folded and placed into a box. An independent person was used to select one folded paper from the box after shuffling. The sampled district Rwamagana was involved in the selection of one sector (Kigabiro).

Stage Three: Selection of Sector:

A sheet of paper containing names of all 14 sectors in the sampled district constituted a sampling frame. After this was done, a single sector, Kigabiro, was randomly selected by repeating the techniques outlined in the second stage.

Stage Four: Household Clusters and Sample Units Selection:

The Central Statistical Offices were approached to provide maps of Census Enumeration Areas (CEA) where Census Statistical Areas (CSA) has been selected. The CSA records in the form of documents depicting clusters (Cellules, *utugari*) of housing units with numbers constituted a sampling frame. Since our sample size was 355, this was proportionately divided into five Cellules giving us a maximum of 71 persons per Cellule. In each Cellule, houses were randomly selected using house numbers as a sampling frame. To this effect, any individual aged between 18 and 65 who was found at each selected house was approached and requested to take part in the study after giving their informed consent. Thus, the selection of houses continued until a number of 71 persons was saturated in every cellule.

3.7.2 Sample size

The sample size has been calculated using the Raosoft sample size calculator (Raosoft, 2004). Below is a table showing how the sample size has been calculated:

Table 3.1: Calculation of the sample size

Margin of error (5% is a common choice)	5%	Margin of error is the amount of error that you can tolerate.
Confidence level (typical choices are 90%, 95%, or 99%)	95%	Confidence level is the amount of uncertainty you can tolerate.
Population size	4556	How many people are there to choose your random sample from?
Response distribution	50%	For each question, what do you expect the results will be?
Recommended sample size	355	The recommended sample size after calculation.

For a population size (N) of 4556 people, a margin of error (E) of 5%, the fraction of responses that is of interest (r) of 50% (yielding the largest sample size), and Z (c/100) as the critical value for the confidence level c (95%), the calculator yielded a result of 355 people.

3.8 Data collection

Data collection refers to pieces of information collected during a study (Sim & Wright, 2000). Data collection is the precise, systematic gathering of information relevant to the research purpose, or specific objectives, questions or hypothesis of a study (Polit & Beck, 2008). A structured data-collection approach always operates with a formal written instrument known as a structured interview schedule or a questionnaire. Polit and Beck (2008) identified the following characteristics of a structured data collection:

- The wording is pre-determined and standardised.
- The same method or instrument is used for all respondents.
- It involves developing possible responses to questions designed by the researcher before data collection.
- The order and the sequence of questions are specified and uniform.
- Data collected can be quantified with ease.

In this study, a structured data collection approach was used as the data has been quantified at the end.

3.8.1 Data collection instrument and technique

The researcher used a self-report as a technique to collect data. According to Brink (2006), self-report techniques are used when the researcher's objective is to find out the participant's thoughts, perceptions, attitudes, beliefs, feelings, motives, plans, experiences, knowledge levels and memories. The same author further declares that these techniques are called self-report because subjects must answer the questions about the study variable directly. Self-report instruments include questionnaires, scales and interviews (Brink, 2006).

The instrument used in this study was a structured questionnaire developed by the researcher using objectives, literature review and theoretical framework as a point of departure. A data collection instrument is a tool used to collect data and information from respondents; a structured questionnaire is one in which the questions asked are precisely decided in advance (Brink, 2006). The questionnaire was structured and pre-coded to facilitate for ease of data capturing, entry onto spreadsheets on Statistical Package for Social Sciences (SPSS) and auditing. It had three main sections, namely socio-demographic data, people's knowledge of diabetes and people's perceptions of diabetes. It was consisted mainly of structured, closed-ended questions: single or multiple responses and Likert scale questions. Highly structured, closed-ended questions are useful in that they can generate frequencies of response amenable to statistical treatment and analysis (Cohen et al., 2000). A small number of semi-open-ended questions were included. The questionnaire has been translated into the local language (Kinyarwanda) in order to allow common understanding among participants.

According to Fielder, cited by Kigozi (2008), there are four main ways of administering questionnaires: face-to-face interviewing, which is useful but expensive in terms of employing and training interviewers; handout questionnaires, when there is a readily available and clearly defined population who are all located in one place at a given time; postal questionnaires; and telephone questionnaires. The researcher used handout questionnaires for literate people and face-to-face interviewing for illiterate people.

3.9 Pilot study

Pilot testing is an important stage in the development of a new survey instrument. According to Haralambos and Holborn (2000), a pilot study (also called a pilot experiment) is a small-scale preliminary study conducted before the main research in order to check the feasibility or to improve the design of the research. They are frequently carried out before large-scale quantitative research in an attempt to avoid time and money being wasted on an inadequately designed project. A pilot study is usually carried out on members of the relevant population, but not on those who will form part of the final sample; this is because it may influence the later behaviour of research subjects if they have already been involved in the research.

Ten people from Rwamagana district who were not included in the main study were asked to take part in the pilot study to evaluate the quality in terms of clarity and time taken to complete the questionnaire. Based on the pilot test, some changes were considered to increase the clarity of statements.

3.10 Validity and reliability

Validity and reliability are the major criteria for assessing the instruments quality and adequacy (Polit & Beck, 2008).

3.10.1 Validity of research instruments

Validity is defined as a degree to which an instrument measures what is supposed to measure (Polit & Beck, 2008). Content validity, which is defined as an assessment of how well the instrument represents all the components of the variable to be measured, was used by developing the questionnaire with research objectives, literature review and theoretical framework as a point of departure. Furthermore, the research supervisor guided this process, and the questionnaire was presented to the School of Nursing which approved the instrument after comments and suggestions.

Table 3.2: Content validity

Objectives	Questions
To explore Rwamagana residents' knowledge of diabetes	Section B B1, B2, B3, B4,B5,B6
To determine Rwamagana people's perceptions regarding causes complications and treatment of diabetes.	Section C C1, C2,C3
To find out the perceived risk of developing diabetes among Rwamagana 's residents	C4
To identify the people's perceptions regarding diabetes prevalence, prevention and behaviour change in Rwamagana district	C5, C6 and C7

3.10.2 Reliability

Polit and Beck (2008) describe reliability as the consistency with which an instrument measures the attribute. According to Burns and Grove (2005), for the instrument to be reliable, it must yield the same measure when used twice. According to Clifford, Carnwell, and Harken (1997), test-retest method is a useful technique commonly applied to determine the reliability of a method and appropriate in quantitative studies.

Litwin (2003) defines test-retest reliability as a measure of the stability of response over time in the same group of respondents. The researcher administers the survey instrument to the same respondents to complete at two different points in time in order to see how stable their responses are. Correlation coefficient is a statistical measure of how closely two variables or measures are related to each other (Litwin, 2003).

In general, the correlation coefficients are considered good if they are at least 0.70 (Litwin, 2003). This implies that surveys responses are reasonably consistent from one point in time to another.

In this study reliability has been ensured by using test-retest in the pilot study. The research instrument was administered to ten people, and one week later re-administered to the same people. The test-retest coefficient was 0.84.

3.11 Data collection procedure

Permission was obtained from the authorities of Rwamagana District to enter Kigabiro sector. The researcher contacted the person in charge of Health at the sector and asked him to assist in the data collection by informing the people of Kigabiro sector about study so that they could prepare themselves and be ready to participate. Two research assistants assisted in data collection. In two of the selected Cellules, the researcher provided an assistant in each case with 71 questionnaires and the numbers of selected houses; the assistant then visited every selected house and any individual aged between 18 and 65 who was found at each of the selected houses was approached and requested to take part in the study after giving informed consent on the basis of a brief introduction. The two assistants collected data in two of the cellules and the researcher collected in the other three cellules. The data was collected over the course of one week. The research assistants were trained before they assisted in research data collection to ensure uniformity.

The questionnaire was delivered in two ways: through handouts and through interview schedules:

Handouts were used for the literate participants: the researcher or the assistant administered the questionnaire to each participant with a covering letter that explaining the purpose of the study, clear and included concise instructions for completing the questionnaire. The participants were each given 20 minutes to read the questionnaire and ask for any clarification, after which they had 30 minutes to fill the questionnaires. After 30 minutes, the researcher or assistant collected the questionnaire, allowing more time to anyone who needed it.

For illiterate participants an interview schedule was used, conducted by the researcher or an assistant. Each interview took place in an undisturbed place chosen by the participant in or around his/her house; the interviewer used the same structured questionnaire in each case to record participant's answers. The research assistants were given the questionnaire in advance so that they could read and re-read it to familiarise themselves with the questions and would be able to work through the questionnaire quickly and efficiently.

3.12 Data analysis

The quantitative data collected from the closed-ended questions were edited, coded, categorized and analyzed using SPSS version 15.0 for Windows. As most of our data was nominal or ordinal, percentages (proportions) were the only descriptive statistics to report in univariate analysis. Data was aggregated and presented numerically, in tables and graphs. Bivariate analysis was done using contingency tables, then the chi-square test was used to measure associations between socio-demographic variables and our variables of interest (i.e., diabetes knowledge). In the analysis, taking our level of confidence at 95%, and implying a 5% level of significance, any p=value of less than 0.05 was therefore interpreted as significant. Contingency tables and chi-square tests were also used to determine the association between:

- A positive family history of diabetes and perceived risk of developing diabetes
- A positive family history of diabetes and the planning of behaviour change
- The relationship between the various components of knowledge (i.e., disease definition, symptoms, risk factors, complications and preventive measures) and socio-demographic factors
- Awareness of risk factors and the knowledge of diabetes prevention
- Awareness of risk factors and the recent behaviour change

3.13 Ethical considerations

Research that involves human beings as subjects should be conducted in an ethical manner to protect their rights. Polit and Beck (2008) emphasize that when people are used as study respondents, care must be exercised in ensuring that the rights of the respondents are protected. Accordingly, the researcher will obtain permission to conduct the study and will respect the respondents' right to self-determination, privacy, anonymity, confidentiality, fair treatment, and protection from harm and discomfort (Burns & Grove 2001).

3.13.1 Permission

The research proposal was sent for approval to the Research and Ethics Committee of the University of KwaZulu-Natal and also to the authorities of Rwamagana district.

3.13.2 Self- determination

The right to self-determination is based on the ethical principle of respect for persons and indicates that people are capable of controlling their own destiny (Burns & Grove, 2005). The respondents' right to self-determination has been ensured by explaining the purpose and significance of the study to them, obtaining their informed consent, emphasising that participation was free and voluntary, and that they had the right to withdraw from the study at any time without any negative consequences. In addition, the respondents were informed about the non-monetary associated benefits for their participation.

3.13.3 Privacy, confidentiality and anonymity

Privacy is the freedom an individual has to determine the time, extent and general circumstances under which private information will be shared with or withheld from others (Burns & Grove 2003).The respondents' anonymity and confidentiality have been assured by using codes instead of their names; hence no information could be linked to specific respondents. Furthermore, confidentiality was guaranteed through storage of the completed data collection tools in a safe, locked place, and only researcher and researcher supervisor have access to the data collected.

3.14 Data management

All questionnaires are stored in a locked cupboard in a locked office accessible only by the researcher and research supervisor. Final data has been communicated to the supervisor and Head of School at the University of KwaZulu-Natal at the end of the study, and the report of findings was submitted to the Faculty of Health Science in University of KwaZulu-Natal. After five years the stored data will be destroyed.

3.15 Data dissemination

Data will be disseminated to various stakeholders and will be published in a journal accredited by the South African Department of Education.

3.16. Conclusion

This chapter discussed the research design and the methodology in detail, including the research instrument and the method of distributing and collecting the questionnaire to ensure a high return rate. It also discussed the validity, reliability, ethical consideration, data management and data dissemination.

Chapter 4
Results and Analysis

4.1 Introduction

This chapter reports the findings of the study. The biographical data of respondents are described together with the results of the questionnaires which are displayed in tables and graphs using frequency and percentage. The score analysis was calculated by assigning the score to the elements of Likert scale (strongly agree, agree, neutral response, disagree and strongly disagree) in order to explore the level of diabetes knowledge of participants. The higher the score, the better knowledge. A total of 355 people were invited to participate in the study; 301 respondents completed the questionnaires. The response rate was 85%.

4.2 Biographical data

According to the table below (Table 4.1), 47.5% (n=143) of respondents were male and 52.5% (n=158) were female. Of the respondents, 8.6% (n=26) were 18 years old, 38.9% (n=117) were between 19 and 35 years old, 32.2% (n=97) were between 36 and 45 years old and 20.3% (n=61) were between 46 and 65 years old. Of the respondents, 44.9% (n=135) were single, 39.2% (n=118) were married, 2% (n=6) were divorced, 10.6% (n=32) were widowed and 3.3% (n=10) were in a cohabitation relationship. Of the respondents, 10% (n=30) had diabetes in their family while 90% (n=271) did not have diabetes in their family. Of respondents, 15.9% (n=48) did not have any educational level, 56.1% (n=169) had primary school as educational level, 26.2% (n=79) had secondary school as educational level and 1.7% (n=5) reported tertiary as their educational level.

Table 4.1: Biographical data of respondents

Biographical data		Frequency	Percentage
Gender	Male	143	47.5%
	Female	158	52.5%
	Total	301	100%
Age	18 years	26	8.6%
	19-35 years	117	38.9%
	36 – 45 years	97	32.2%
	46-65 years	61	20.3%
	Total	301	100%
Marital status	Single	135	44.9%
	Married	118	39.2%
	Divorced	6	2%
	Widow	32	10.6%
	Cohabitation	10	3.3%
	Total	301	100%
Family history of diabetes	Diabetes in my family	30	10%
	No diabetes in my family	271	90%
	Total	301	100%
Educational level	No educational level	48	15.9%
	Primary school	169	56.1%
	Secondary school	79	26.2%
	Tertiary	5	1.7%
	Total	301	100%
Monthly income	</=1000 frw	31	10.3%
	1000-1999 frw	13	4.3%
	2000-2999 frw	10	3.3%
	3000-4999 frw	14	4.7%
	>/=5000 frw	233	77.4%
	Total	301	100%

4.3 People's knowledge of diabetes

4.3.1 Knowledge related to diabetes definition/meaning

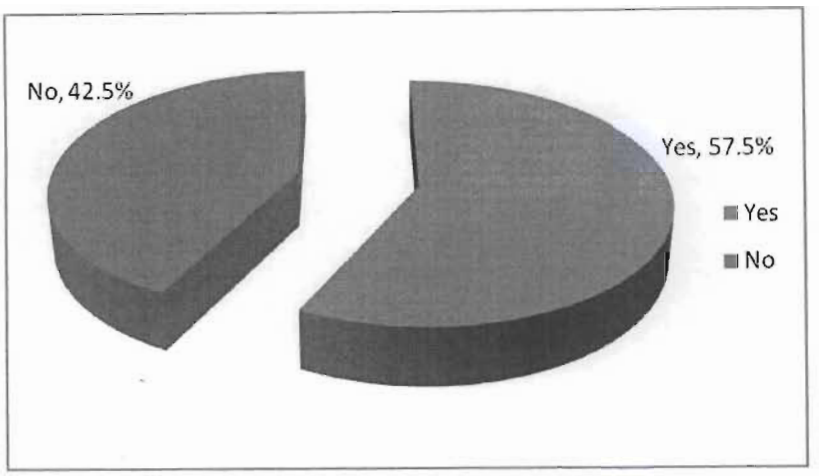

Figure 4-1: Frequency of people who know what diabetes means (N=301)

Of the respondents, more than half 57.5% (n=173) reported that they knew what diabetes means while more than one third 42.5% (n=128) did not know what diabetes means.

Table 4.2: Knowledge about the meaning of diabetes (N=173)

Different meanings of diabetes	Strongly agree		Agree		Uncertain		Disagree		Strongly disagree		Total (N=173)	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
A condition of high blood sugar	108	62.4	59	34.1	4	2.3	1	0.6	1	0.6	173	100
A condition of insufficient insulin	4	2.3	27	15.6	134	77.5	4	2.3	4	2.3	173	100
Not responding to insulin	7	4	17	9.8	136	78.6	10	5.8	3	1.7	173	100
Diabetes is non-contagious	15	8.7	33	19.1	113	65.3	7	4	5	2.9	173	100
A disease of rich people	19	11	11	6.4	100	57.8	26	15	17	9.8	173	100
A disease of old people	1	0.6	1	0.6	109	63	25	14.5	37	21.4	173	100

Respondents who knew what diabetes means were asked to agree or disagree with the given statements relating to the meaning of diabetes. This question was answered by 173

respondents. The first statement was "Diabetes is a condition of high blood sugar": of the respondents, the majority, 96.5% (n=167), strongly agreed or agreed that diabetes is a condition of high blood sugar while only 1.2% (n=2) disagreed or strongly disagreed. The remaining 2.3% (n=4) were uncertain.

The second statement was "Diabetes is a condition of insufficient insulin"; only 17.9% (n=31) strongly agreed or agreed that diabetes is condition of insufficient insulin, 4.6% (n=8) disagreed or strongly disagreed that diabetes is a condition of insufficient insulin. The majority, 77.5% (n= 134), were uncertain.

The third statement was "Diabetes is a condition of the body not responding to the insulin"; only 13.8% (n=27) strongly agreed or agreed, while 7.5% (n=13) disagreed or strongly disagreed. The majority, 78.6% (136), were uncertain.

The fourth statement was "Diabetes is non-contagious"; here once more a substantial majority, 65.3% (n=113), were uncertain, while only 27.8% (n=48) strongly agreed or agreed that diabetes is non-contagious; 6.9% (n=12) disagreed or strongly disagreed that diabetes is non-contagious.

The fifth statement was "Diabetes is a disease of rich people"; again, more than half, 57.8% (n=100), were uncertain, only 17.4% (n=30) strongly agreed or agreed that diabetes is a disease of rich people, while 24.8% (n=43) disagreed or strongly disagreed.

The last statement was "Diabetes is a disease of old people"; more than half, 63% (n=109), were uncertain, the minority, 1.2% (n=2), strongly agreed or agreed, and 35.9% (n=65) disagreed or strongly disagreed that diabetes is a disease of old people.

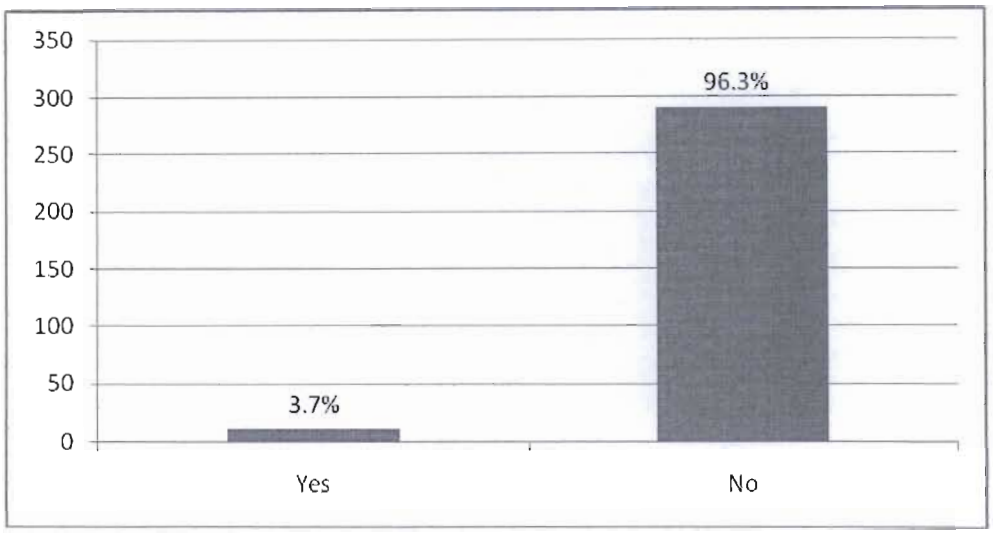

Figure 4-2: Frequency of people who know the types of diabetes (N=301)

Only 3.7% (n=11) of respondents knew the types of diabetes while the vast majority 96.3% (n=290) did not.

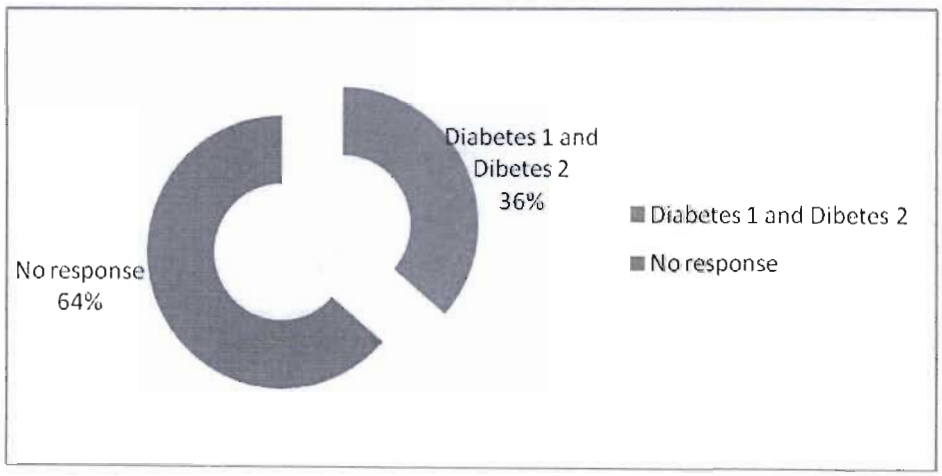

Figure 4-3: Knowledge about types of diabetes (N=11)

Of the respondents who replied that they knew the types of diabetes, 3.7% (n=11) were asked to specify those types. Only 36.4% (n=4) knew the two types of diabetes (diabetes type 1 and diabetes type 2) while the rest of the respondents 63.6% (n= 7) did not.

Table 4.3: Score analysis: people who know the meaning of diabetes

Score	Frequency	%
14	2	1.2
17	2	1.2
18	6	3.5
19	44	25.4
20	54	31.2
21	23	13.3
22	17	9.8
23	3	1.7
24	6	3.5
25	5	2.9
26	5	2.9
27	4	2.3
28	1	0.6
30	1	0.6
Total	173	100

This table shows that only 0.6% (n=1) responded correctly to the question intended to explore the knowledge of participants regarding the definition of diabetes.

4.3.2 Knowledge related to signs and symptoms of diabetes

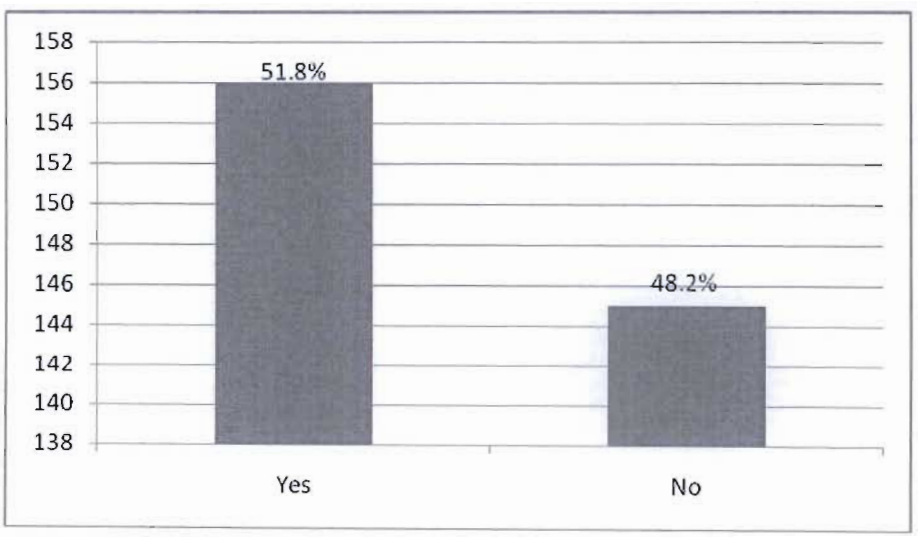

Figure 4-4: Frequency of people who know any signs/symptoms of diabetes (N=301)

More than half the respondents, 51.8% (n=156), reported that they know the signs/symptoms of diabetes while more than one third, 48.2% (n=145), answered that they do not know any sign/symptom of diabetes.

A number of signs and symptoms of diabetes were given to those respondents who replied that they know the signs/symptoms of diabetes, 51.8% (n=156), and they were asked to agree or disagree. The list of signs/symptoms was: tiredness and weaknesses, constant feeling of thirst, weight loss despite normal appetite, blurred vision, and slow healing of cuts and wounds.

Table 4.4: Knowledge of signs/symptoms of diabetes (N=156)

Signs and symptoms of diabetes	Strongly agree		Agree		Uncertain		Disagree		Strongly disagree		Total (N=156)	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Tiredness and weakness	19	12.2	56	35.9	79	50.6	2	1.3			156	100
Constant feeling of thirsty	32	20.5	98	62.8	22	14.1	3	1.9	1	0.6	153	100
Weight loss despite normal appetite	7	4.5	27	17.3	93	59.6	22	14.1	7	4.5	156	100
Blurred vision	4	2.6	14	9	116	74.4	14	9	8	5.1	156	100
Slow healing of cuts and wounds	2	1.3	13	8.3	118	75.6	15	9.6	8	5.1	156	100

Respondents who replied that they knew the signs/symptoms of diabetes were asked to agree or disagree with the given statements relating to the signs/symptoms of diabetes; 156 participants answered this question;. On tiredness and weaknesses as a sign of diabetes, 48.1% (n=75) strongly agreed or agreed while only 1.3 %(n=2) disagreed; half of the respondents, 50.6% (n=79), were uncertain.

On constant feeling of thirst as a sign of diabetes, a large majority 83.3% (n=130) strongly agreed or agreed that, while just 2.5% (n=4) disagreed or strongly disagreed and 14.1% (n=22) were uncertain.

On weight loss despite normal appetite as a sign of diabetes, 21.8% (n=34) strongly agreed or agreed, 18.6% (n=29) disagreed or strongly disagreed, and the largest big proportion 59.6% (n=93) were uncertain.

On blurred vision as a sign of diabetes, only 11.6% (n=18) strongly agreed or agreed; 14.1% (n=22) disagreed or strongly disagreed, and more than half, 74.4%% (n=116), were uncertain.

On slow healing of cuts and wounds as a sign of diabetes, only 9.6% (n=15) strongly agreed or agreed; 14.7% (n=23) disagreed or strongly disagreed and the majority, 75.6% (n= 118), were uncertain.

Table 4.5: Score analysis: people who know signs/symptoms of diabetes

Score	Frequency	%
11	1	0.6
12	2	1.3
13	1	0.6
14	7	4.5
16	60	38.5
17	22	14.1
18	17	10.9
19	9	5.8
20	3	1.9
21	3	1.9
22	1	0.6
25	**2**	**1.3**
Total	156	100%

The table demonstrates that only 1.3% (n=2) answered correctly to the question aimed to identify people who knew the signs/symptoms of diabetes.

4.3.3 Knowledge related to the causes of diabetes

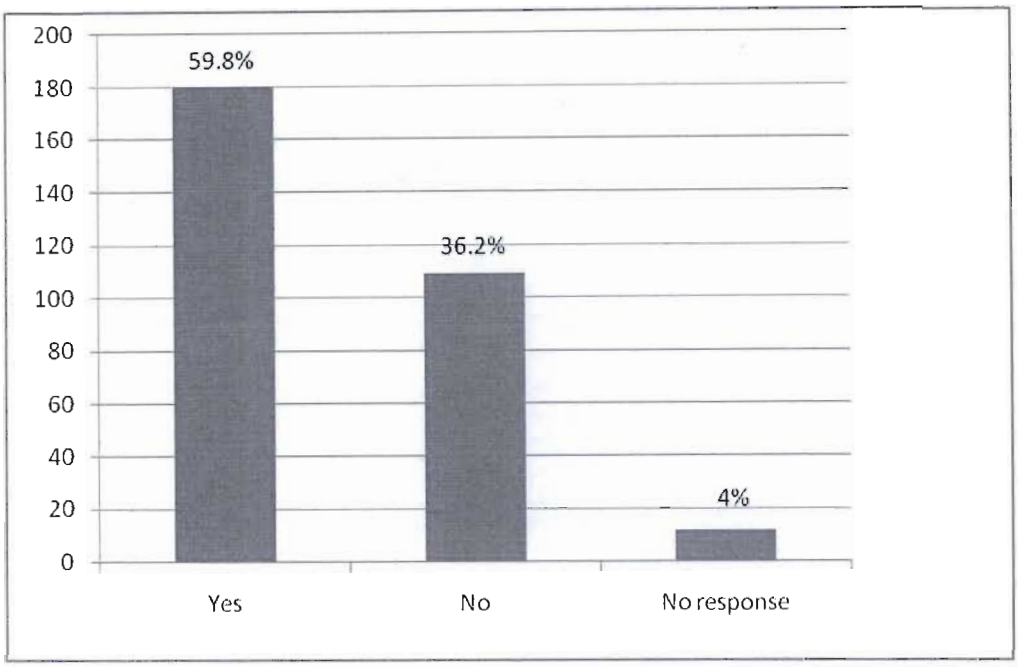

Figure 4-5: Frequency of people who know the causes of diabetes (N=301)

More than half the respondents, 59.8% (n=180), answered that they know the causes of diabetes while more than one third 36.2% (n=109) replied that they had no knowledge about the causes of diabetes.; 4% (n=12) gave no answer.

Table 4.6: Knowledge about causes of diabetes (N=180)

Causes of diabetes	Strongly agree		Agree		Uncertain		Disagree		Strongly disagree		Total (N=180)	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Too much sugar	107	59.4	70	38.9	3	1.7					180	100
Obesity	19	10.6	85	47.2	61	33.9	6	3.3	9	5	180	100
Aging	2	1.1	2	1.1	95	52.8	27	15	54	30	180	100
Less active life style	3	1.7	20	11.1	97	53.9	16	8.9	44	24.4	180	100
Inheritable genetic disease	11	6.1	27	15	114	63.3	12	6.7	16	8.9	180	100
Excessive smoking			15	8.3	130	72.2	21	11.7	14	7.8	180	100
Insulin deficiency	7	3.9	35	19.4	126	70	7	3.9	5	2.8	180	100
Stress			8	4.4	108	60	19	10.6	45	25	180	100
High-fat-diets	13	7.2	86	47.8	69	38.3	6	3.3	6	3.3	180	100

Respondents who replied that they know the causes of diabetes, 59.8% (n=180), were asked to agreed or disagreed with the given causes of diabetes.

On too much sugar causing diabetes, nearly all, 98.3% (n=177), strongly agreed or agreed, while only 1.7% (n=3) were uncertain.

On obesity causing diabetes, More than half, 57.8% (n=104), agreed or strongly agreed, 8.3% (n=15) strongly disagreed or disagreed, and one third, 33.9% (n=61), were uncertain.

Only 2.2% (n=4) strongly agreed or agreed that aging causes diabetes, while more than one third 45% (n=81) strongly disagreed or disagreed. Nevertheless more than half 52.8% (n=95) were uncertain.

On less active lifestyle causing diabetes, just 12.8% (n=23) strongly agreed or agreed, one third, 33.3% (n=60), strongly disagreed or disagreed, and more than half, 53.9% (n=97), were uncertain.

On diabetes being an inheritable genetic disease, only 21.1% (n=38) strongly agreed or agreed, 15.6% (n=28) strongly disagreed or disagreed, and more than half, 63.3% (n=114), were uncertain.

On excessive smoking causing diabetes, only 8.3% (n=15) agreed, 19.5% (n=35) strongly disagreed or disagreed, and a large majority, 72.2% (n=130), were uncertain.

On insulin deficiency causing diabetes, less than a quarter, 23.3% (n=42), strongly agreed or agreed, 6.7% (n=12) strongly disagreed or disagreed, and the majority, 70% (n= 126), were uncertain.

On stress causing diabetes, only 4.4% (n=8) agreed, more than a third, 35.6% (n=64), strongly disagreed or disagreed, and more than half, 60%(n=108), were uncertain.

On high-fat-diets causing diabetes, more than half, 55% (n=99), strongly agreed or agreed, only 6.6% (n=12) strongly disagreed or disagreed, and 38.3% (n=69) were uncertain.

Table 4.7: Score analysis: people who know causes of diabetes

Score	Frequency	%
19	1	0.6
20	1	0.6
21	2	1.1
22	5	2.8
23	13	7.2
24	30	16.7
25	45	25
26	23	12.8
27	6	3.3
28	5	2.8
29	11	6.1
30	6	3.3
31	8	4.4
32	13	7.2
33	8	4.4
34	1	0.6
35	1	0.6
38	1	0.6
Total	180	100

The table indicates that only 0.6% (n=1) scored high on the question intended to investigate participants' knowledge regarding the causes of diabetes. No one replied appropriately to the question, so there is no one who got the total score of 45.

4.3.4 Knowledge related to risk factors of diabetes

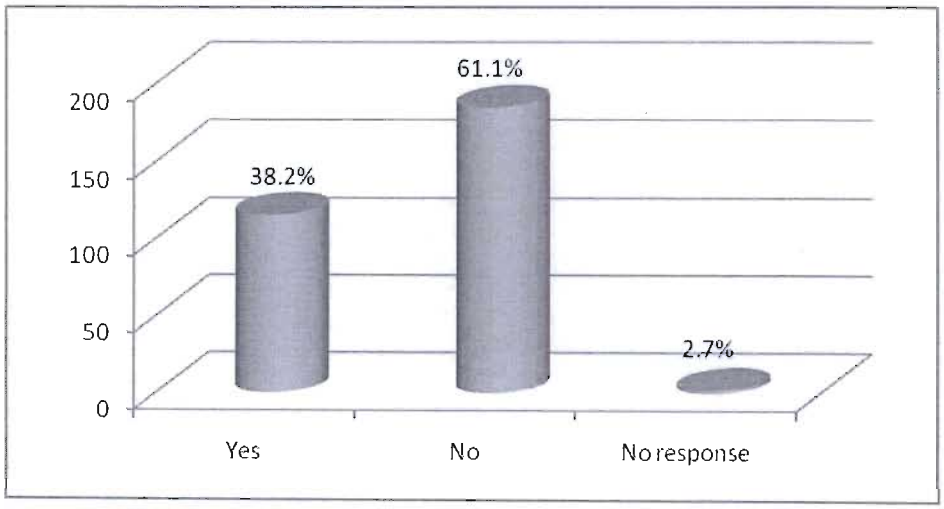

Figure 4-6: Frequency of people who know any factor increasing the risk of developing diabetes

Only 38.2% (n=115) of respondents answered that they are aware of the factors that could increase the risk of developing diabetes; more than half 61.1% (n=184) said that they are not aware, and the remaining 0.7% (n=2) gave no answer.

Table 4.8: Awareness of factors increasing risk of developing diabetes (N=115)

Factors	Strongly agree		Agree		Uncertain		Disagree		Strongly disagree		Total (N=115)	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Obesity	39	33.9	45	39.1	28	24.3	1	0.9	2	1.7	115	100
Hypertension	9	7.8	9	7.8	79	68.7	8	7	10	8.7	115	100
Age above 40 years	4	3.5	3	2.6	41	35.7	35	30.4	32	27.8	115	100
High-fat-diets	12	10.4	58	50.4	38	33	4	3.5	3	2.6	115	100
Less active life style	5	4.3	27	23.5	53	46.1	17	14.8	13	11.3	115	100
Family story of diabetes	12	10.4	13	11.3	64	55.7	16	13.9	10	8.7	115	100
Pregnancy			3	2.6	47	40.9	41	35.7	24	20.9	115	100
High alcohol intake	4	3.5	43	37.4	42	36.5	14	12.2	12	10.4	115	100
Excessive sugar intake	64	55.7	49	42.6	1	0.9	1	0.9			115	100

Participants who responded that they are aware of factors that could increase the risk of developing diabetes (N=115) were asked to agree or disagree with the given statements relating to risk factors for developing diabetes.

On obesity as a risk factor, a majority, 73% (n=84), strongly agreed; only 2.6% (n=3) disagreed or strongly disagreed, and the remaining 24.3% (n=28) were uncertain.

On hypertension as a risk factor, only 15.6% (n=18) strongly agreed or agreed, 15.7% (n=18) disagreed or strongly disagreed, and majority, 68.7% (n=79), were uncertain.

On age above 40 as a risk factor, only 6.1% (n=7) strongly agreed or agreed,, more than half 58.2% (n=68) disagreed or strongly disagreed, and the remainder, 35.7% (n=41), were uncertain.

On high fat-diets as a risk factor, more than half, 60.8% (n=68), strongly agreed or agreed, only 6.1% (n=7) disagreed or strongly disagreed, and one third of respondents, 33% (n=38), were uncertain.

On less active lifestyle as a risk factor, 27.8% (n=32) strongly agreed or agreed, 26.1% (n=30) disagreed or strongly disagreed, and 46.1% (n=53) were uncertain.

On family history of diabetes as a risk factor, 21.7% (n=25) strongly agreed or agreed, that the increase the risk of developing diabetes, and 22.6% (n=26) disagreed or strongly disagreed. The big proportion 55.7% (n=64) were uncertain.

On pregnancy as a risk factor, only 2.6% (n=3) agreed, more than half, 56.6% (n=65), disagreed or strongly disagreed, and the remainder, 40.9% (n=47), were uncertain.

On high alcohol intake as a risk factor, 40.9% (n=47) strongly agreed or agreed, 22.6% (n=26) disagreed or strongly disagreed, and 36.5% (n=42) were uncertain.

On excessive sugar intake as a risk factor, almost all, 98.3% (n=113) strongly agreed or agreed, only 0.9% (n=1) disagreed, and another 0.9% (n=1) were uncertain.

Table 4.9: Score analysis: people who know risk factors for diabetes

Score	Frequency	%
15	1	0.9
16	2	1.7
20	1	0.9
23	5	4.3
24	4	3.5
25	4	3.5
26	8	7
27	3	2.6
28	17	14.8
29	23	20
30	13	11.3
31	17	14.8
32	7	6.1
33	2	1.7
34	2	1.7
35	2	1.7
36	2	1.7
38	1	0.9
39	**1**	**0.9**
Total	115	100

The table demonstrates that only 0.9 (n=10%) were able to score the higher mark in the question intended to determine the people who know the risk factors of diabetes. However no one answered the question completely correctly, therefore no one got the total score of 45.

4.3.5 Knowledge related to treatment and management of diabetes at the community level

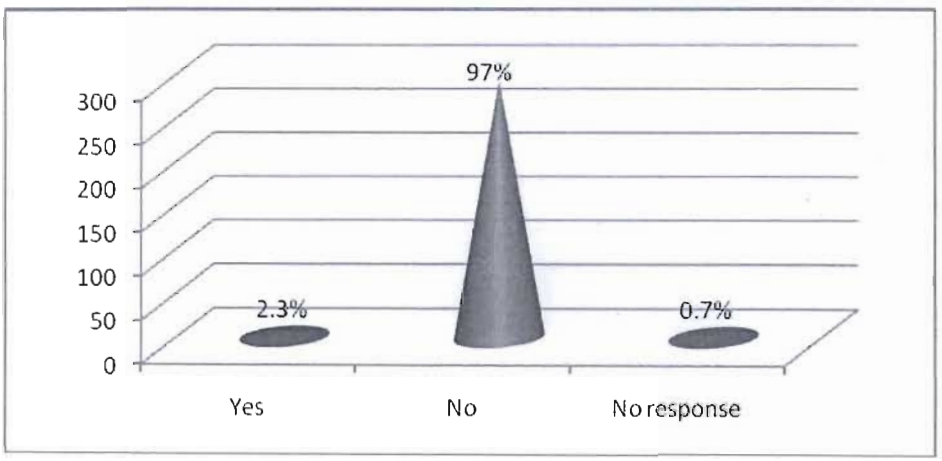

Figure 4-7: Knowledge about available medicines for diabetes (N=301)

Only 2.3% (n=7) of respondents said that they know the available medicines for diabetes, almost all, 97% (n=292), responded that they do not know the available medicines for diabetes, and 0.7% (n=2) gave no answer.

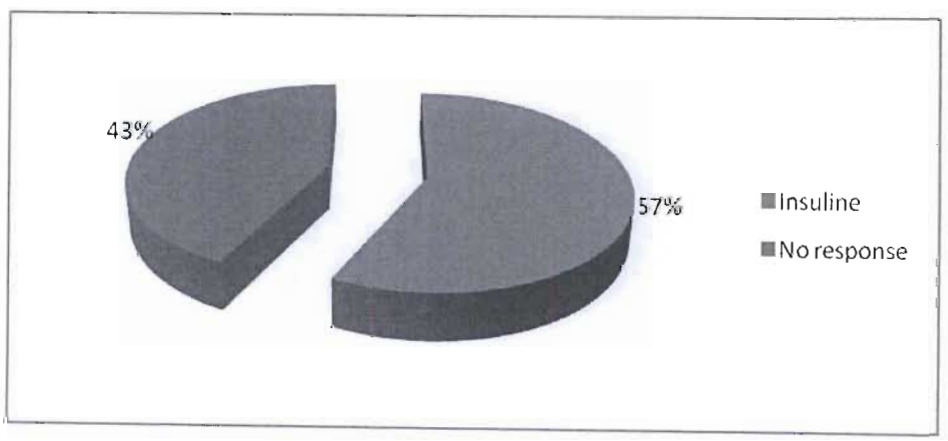

Figure 4-8: Medicines for diabetes (N=7)

Of (N=7) respondents who said that they know the available medicines for diabetes, only 57% (n=4) were able to list insulin as a medicine for diabetes while 43% (n=3) did not list any medicine.

Table 4.10: Emotional support in the community (N=301)

Support givers identified	Frequency	%
Family members	13	4.3
Friends	5	1.7
Doctors/nurses	199	66.1
A local diabetic association	13	4.3
Family members and doctors/nurses	19	6.3
Doctors/Nurses and Local diabetic association	5	1.7
No response	47	15.6
Total	301	100

Asked where diabetics get emotional support in their community, 6% (n=18) of respondents indicated family members or friends as source of emotional support for diabetics, 72.4% (n=218) indicated doctors/nurses or family members, but only 1.7% (n=5) mentioned a local diabetic association as source of emotional support for diabetics in their community. Another 15.6% (n=47) gave no answer.

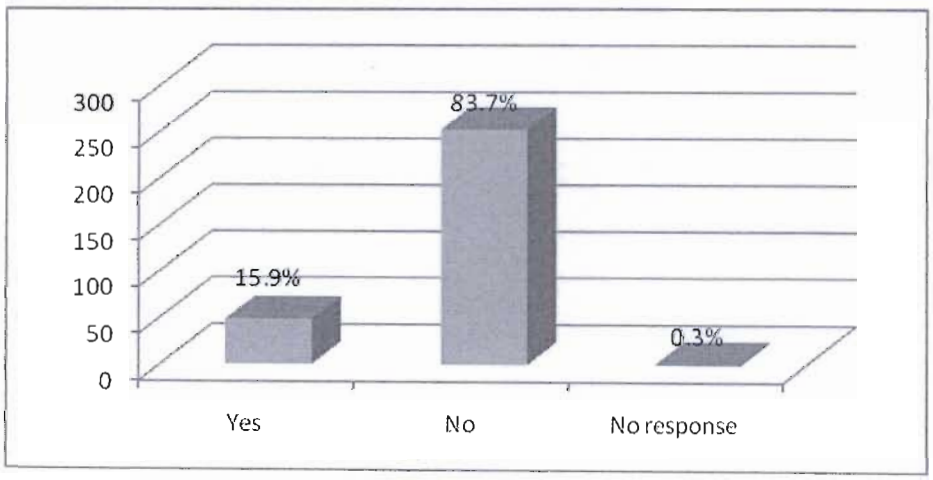

Figure 4-9: Diet for a diabetic(N=301)

Asked if they are able to help a diabetic who needs advice regarding diet, only 15.9% (n=48) of respondents said they were able to help, a large majority 83.7% (n=252) did not know how to help that diabetic, and 0.3 (n=1) gave no response.

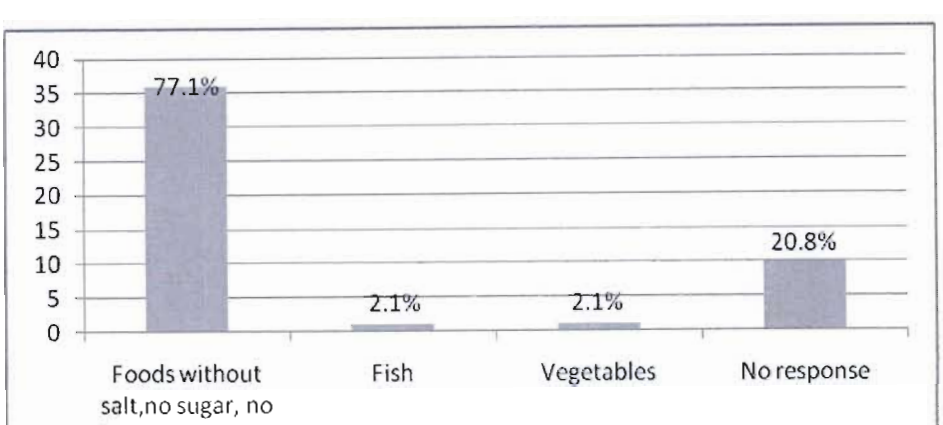

Figure 4-10: Types of foods for a diabetic (N=48)

Respondents who answered that they are able to advise on diet for a diabetic, (N=48), were asked to point out the foods they know a diabetic should eat. A majority, 77.1% (n =37) reported foods without salt, no sugar, no alcohol and no oil, 2.1% (n=1) indicated fish, another 2.1% (n=1) named vegetables, while 20.8% (n=10) did not respond.

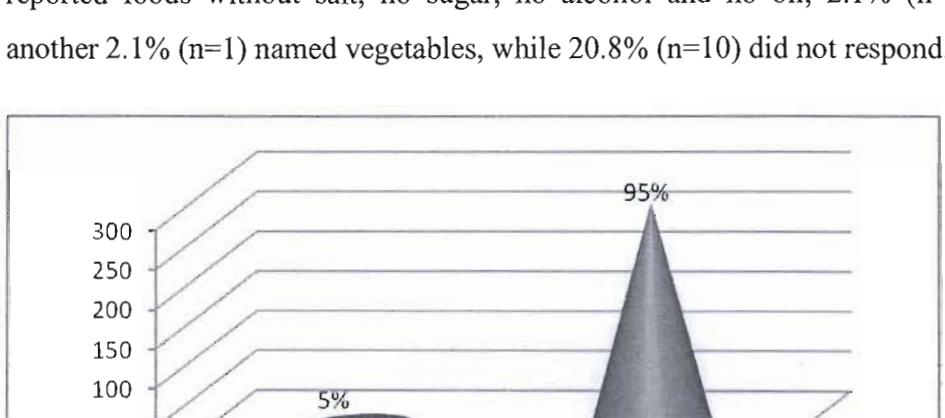

Figure 4-11: Immediate help during the coma caused by diabetes(N=301)

Only 5% (n=15) of respondents answered that they knew how to help a diabetic in coma, while a large majority, 95% (n=286), replied that they do not know.

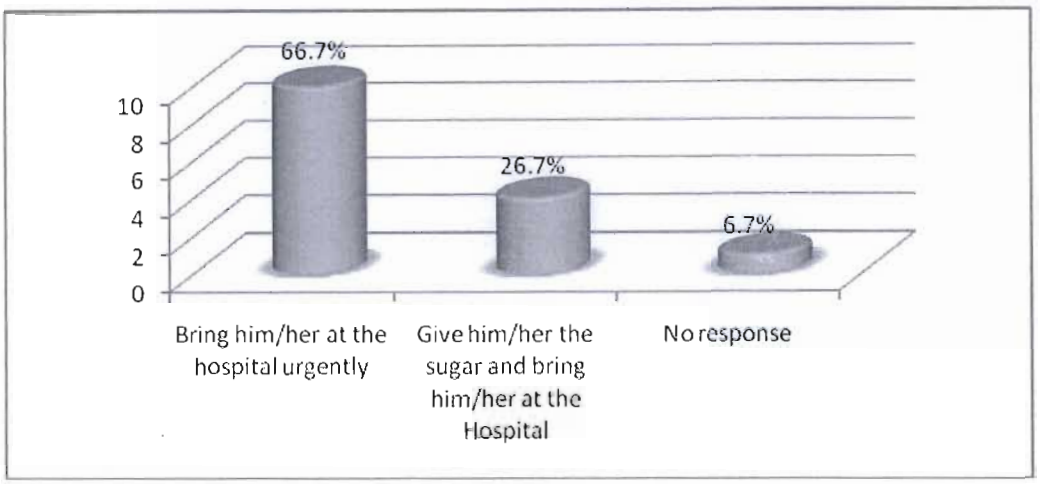

Figure 4-12: What to do during coma caused by diabetes (N=15)

Respondents who replied that they know how to help a diabetic (N=15) were asked what they should do; 66.7 %(n=10) answered that they would take him/her to hospital urgently, 26.7% (n=4) reported that they would give him/her sugar and take him/her to hospital. The rest, 6.7% (n=1), gave no answer.

Table 4.11: Knowledge about management of diabetes (N=301)

Management of diabetes	Strongly agree		Agree		Uncertain		Disagree		Strongly disagree		Total (N=301)	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Observe and respect diet	27	9	53	17.6	206	68.4	14	4.7	1	0.3	301	100
Visit health workers	178	59.1	107	35.5	15	5			1	0.3	301	100
Exercise regularly	25	8.3	62	20.6	206	68.4	8	2.7			301	100
Avoid stress	19	6.3	37	12.3	218	72.4	10	3.3	17	5.6	301	100
Quit smoking	17	5.6	71	23.6	182	60.5	16	5.3	15	5	301	100
Eat as much as possible	8	2.7	6	2	177	58.8	64	21.3	46	15.3	301	100

Respondents were asked to agree or disagree with the given statement relating to diabetes management in order to prevent complications.

Only 26.6% (n=80) strongly agreed or agreed that to observe and respect a diet helps to manage diabetes, 5% (n=15) disagreed or strongly disagreed, and the majority, 68.4% (n=206), were uncertain.

A large majority, 94.6% (285), strongly agreed or agreed that the way to manage diabetes is to visit health workers for medicines and advice; only 0.3% (1) strongly disagreed, and 5% (n=15) were uncertain.

Just over a quarter, 28.9% (n=87), strongly agreed or agreed that exercising regularly is a way of managing diabetes, only 2.7% (n=8) disagreed and a majority, 68.4% (n=206), were uncertain.

Less than a quarter, 18.6% (n=56), strongly agreed or agreed that avoiding stress by resting is a way of managing diabetes, 8.9% (n=27) disagreed or strongly disagreed, and most, 72.4% (n=218), were uncertain.

More than a quarter, 29.2% (n=88), strongly agreed or agreed that quitting smoking is a way of managing diabetes while 10.3% (n=31) disagreed or strongly disagreed; more than half, 60.5% (n=182), were uncertain.

A small number of respondents, 4.7% (n=14), strongly agreed or agreed that in order to manage diabetes a diabetic has to eat as much as possible in order to be healthy, while more than a third, 36.6% (n=110), disagreed or strongly disagreed with this statement, and 58.8% (n=177) were uncertain.

Table 4.12: Score analysis: people who know how to manage diabetes at community level

Score	Frequency	%
11	1	0.3
14	1	0.3
17	1	0.3
18	19	6.3
19	48	15.9
20	113	37.5
21	23	7.6
22	31	10.3
23	21	7
24	21	7
25	3	1
26	8	2.3
27	4	1.3
28	5	1.7
29	1	0.3
30	**1**	**0.3**
Total	301	100

The table shows that only 0.3% (n=1) responded correctly to the question designed to determine the participants who knew how to manage diabetes at the community level.

4.3.6 Knowledge related to diabetes prevention

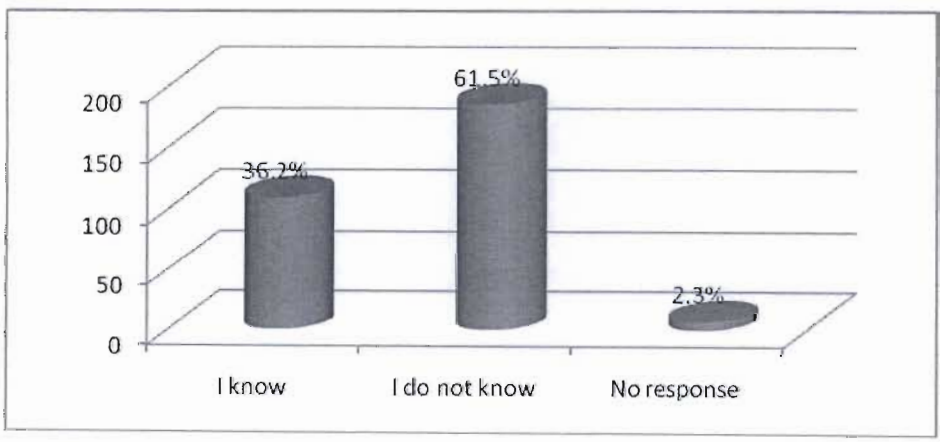

Figure 4-13: Frequency of people who know how to prevent diabetes(N=301)

Only 36.2% (n=109) of respondents said that they know how to prevent diabetes; more than half, 61.5% (n=185), said that they do not know how to prevent it, and 2.3% (n=7) gave no answer.

Table 4.13: Knowledge of diabetes prevention (N=109)

Prevention of diabetes	Strongly agree		Agree		Uncertain		Disagree		Strongly disagree		Total (N=109)	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Eating healthy low-fats diets	32	29.4	37	33.9	32	29.4	4	3.7	4	3.7	109	100
Eating high-fiber diets	8	7.3	21	19.3	72	66.1	8	7.3			109	100
Exercising	19	17.4	56	51.4	33	30.3	1	0.9			109	100
Quit smoking	6	5.5	38	34.9	53	48.6	10	9.2	2	1.8	109	100
Diabetes screening	49	45	53	48.6	6	5.5	1	0.9			109	100
Keeping alcohol consumption low	8	7.3	55	50.5	38	34.9	7	6.4	1	0.9	109	100
Avoiding obesity	33	30.3	45	41.3	27	24.8	2	1.8	2	1.8	109	100

Respondents who answered that they know how to prevent diabetes (N=109) were asked to agree or disagree with the statement relating to the prevention of diabetes.

Two thirds, 66.3% (n=69), strongly agreed or agreed that eating healthy low fat-diets is a way to prevent diabetes while only 7.4% (n=8) disagreed or strongly disagreed with that statement. The rest, 29.4% (n=32), were uncertain.

Just over a quarter, 26.6% (n=29), strongly agreed or agreed that eating high-fibre diets is a way to prevent diabetes; 7.3% (n=8) disagreed with the statement, and two thirds, 66% (n=72) were uncertain.

A majority of respondents 68.8% (n=75) strongly agreed or agreed that exercising help to prevent diabetes, whereas only 0.9% (n=1) disagreed; nearly one third of respondents 30.3% (n=33), were uncertain.

Those who strongly agreed or agreed that quitting smoking helps to prevent diabetes amounted to 40.4% (n=44), while 11% (n=12) disagreed or strongly disagreed and 48.6% (n=53) were uncertain.

A large majority, 93.6% (n=102), strongly agreed or agreed that diabetes screening helps to prevent diabetes, while only 0.9% (n=5) disagreed and the remainder, 5.5% (n=6), were uncertain.

A majority, 57.8% (n=63), strongly agreed or agreed that keeping alcohol consumption low helps to prevent diabetes, only 7.3% (n=8) disagreed or strongly disagreed, and 34.9% (n=38) were uncertain.

A majority, 71.6% (n=78), strongly agreed or agreed that avoiding obesity helps to prevent diabetes, 3.6% (n=4) disagreed or strongly disagreed with the statement, and 24.8% (n=27) were uncertain.

Table 4.14: Score analysis: people who know how to prevent diabetes

Score	Frequency	%
17	1	0.9
21	7	6.4
22	7	6.4
23	16	14.7
24	7	6.4
25	3	2.8
26	16	14.7
27	15	13.8
28	11	10.1
29	12	11
30	7	6.4
32	1	0.9
33	2	1.8
34	1	0.9
35	**3**	**2.8**
Total	109	100

The table demonstrates that only 2.8% (n=3) correctly answered the question aimed to discover participants who knew how to prevent diabetes.

4.4 People's perceptions of diabetes

4.4.1 Perceptions of causes

Table 4.15: Perceptions about causes of diabetes(N=301)

Causes	Strongly agree		Agree		Uncertain		Disagree		Strongly disagree		Total (N=301)	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
A genetic cause	37	12.3	27	9	203	67.4	27	9	7	2.3	301	100
Socio-economic causes	1	0.3	11	3.7	201	66.8	35	11.6	53	17.6	301	100
Unhealthy behaviours	33	11	140	46.5	89	29.6	18	6	21	7	301	100
Unhealthy food intake	61	20.3	181	60.1	41	13.6	3	1	15	5	301	100
Obesity	27	9	87	28.9	167	55.5	7	2.3	13	4.3	301	100
Age	5	1.7	6	2	120	39.9	59	19.6	111	36.9	301	100
God's will	24	8	94	31.2	98	32.6	55	18.3	30	10	301	100
People	3	1	4	1.3	75	24.9	138	45.8	81	26.9	301	100

Somewhat less than a quarter of respondents, 21.3% (n=64), thought that the cause of diabetes is genetic, while 11.3% (n=34) thought that genetics is not a cause of diabetes; the majority. 67.4% (n=203), were uncertain.

Only 4% (n=12) believed that diabetes is caused by socio-economic factors, while 29.2% (n=88) thought this was not the case; the majority, 66.8% (n=201), were uncertain.

Just over half, 57.5% (n=173), believed that unhealthy behaviour style causes diabetes, while only 13% (n=39) did not believe in this statement and 29.6% (n=89) were uncertain.

A large majority, 80.4% (n=242), thought that diabetes is caused by unhealthy food intake, while 6% (n=18) thought this was not true; 13.6% (n=41) were uncertain.

Over a third, 37.9% (n=114), believed that obesity causes diabetes, 6.6% (n=20), thought this was not the case, and more than half, 55.5% (n=167), were uncertain.

Only 3.7% (n=11) thought that age causes diabetes, more than half 56.5% (n=170) thought this was not the case, and 39.9% (n=120) were uncertain.

More than a third 39.2% (118) believed that diabetes is caused by the will of God, 28.3% (n=85) did not believe this to be the case, and 32.6% (n=98) were uncertain.

A small number of respondents, 2.3% (n=3), thought diabetes is caused by people – for example through witchcraft – but a large majority 72.7% (n=219) did not believe this was the case; 24.9% (n=75) were uncertain.

4.4.2 Perceptions of complications

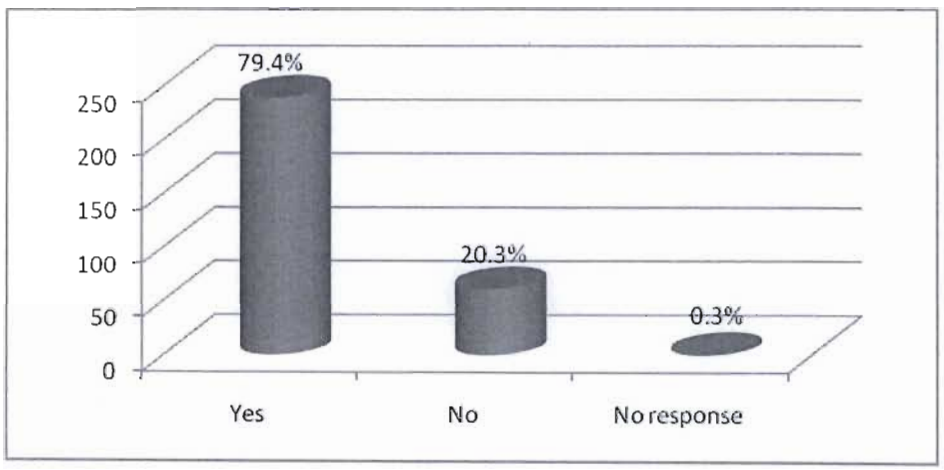

Figure 4-14: Perceptions of the severity of diabetes(N=301)

A large majority, 79.4% (239), thought diabetes is a severe disease, while 20.3% (n=61) thought diabetes is not a severe disease; 0.3 (n=1) gave no response.

Table 4.16: Perceptions of the severity of diabetes(N=301)

Perceptions of severity	Frequency	%
Diabetes equals death	57	18.9
Diabetes is a simple disease of rich people	91	30.2
Diabetes is a simple disease of old people	4	1.3
Diabetes is severe but curable disease	11	3.7
Diabetes is severe but manageable disease	120	39.9
No response	18	6
Total	301	100

Diabetes was regarded as synonymous with death by 18.9% (n=57) of respondents, 30.2% (n=91) saw diabetes as a simple disease of rich people, 1.3% (n=4) saw it as a simple disease of old people, 3.7% (n=11) saw it as a severe disease but curable, and 39.9% (n=120) saw it as a severe manageable disease; 6% (n=18) gave no response.

4.4.3 Perceptions of diabetes treatment

Table 4.17: Perceptions about what can cure diabetes(N=301)

Perceived cures	Frequency	%
Western medicine	77	25.6
Traditional medicine (herbs)	2	0.7
Traditional healers	4	1.3
God (praying and fasting)	13	4.3
Western medicine combined with traditional medicine	16	5.3
Western medicine combine with prayers	4	1.3
No cure for diabetes	185	61.5
Total	301	100

A quarter of the respondents, 25.6% (n=77), thought that diabetes can be cured by western medicine, 2% (n=6) believed that it can be cured with traditional medicine (herbs) or by traditional healers, 4.3% (n=13) believed that with prayer and fasting God may cure diabetes; 5.3% (n=16) thought that a combination of western medicine and traditional medicine may cure diabetes, while 1.3% (n=4) believed that diabetes may be cured by the combination of western medicine and prayers. But a majority, 61.5% (n=185), believed that there is no cure for diabetes.

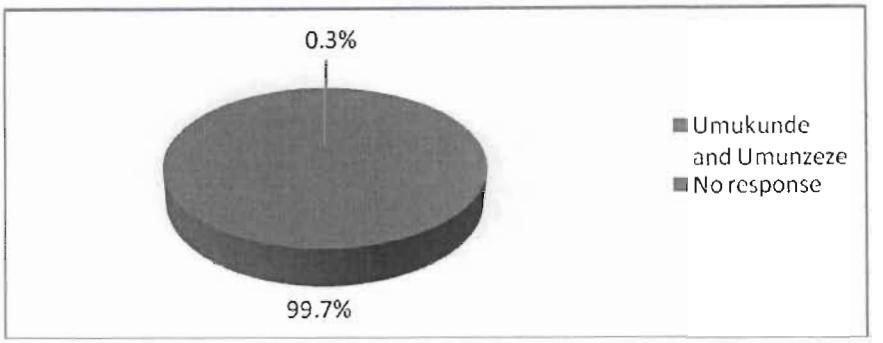

Figure 4-15: Names of traditional medicines(N=301)

Respondents were asked to enumerate the traditional medicines they think may cure diabetes; a single respondent, 0.3% (1), named *Umukunde*; all the others, 99.7% (n=300), gave no response.

Table 4.18: Perceptions about diabetes management(N=301)

Perceptions about diabetes management	Strongly agree		Agree		Uncertain		Disagree		Strongly disagree		Total (N=301)	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Praying and fasting	33	11	40	13.3	145	48.2	61	20.3	22	7.3	301	100
Consulting traditional healers	2	0.7	38	12.6	179	59.5	34	11.3	48	15.9	301	100
Consulting medical doctors	181	60.1	91	30.2	19	6.3	9	3	1	0.3	301	100
Seek herbal medicines	5	1.7	50	16.6	152	50.5	26	8.6	68	22.6	301	100
Eating vegetables and non-fat and non-sweet foods	31	10.3	89	29.6	172	57.1	3	1	6	2	301	100
Combining traditional medicine and western treatment	5	1.7	8	2.7	104	34.6	76	25.2	108	35.9	301	100

Respondents were asked to agree or disagree with the statement describing what they think they should do to manage diabetes if they were ever diabetic.

Just under a quarter, 24.3% (n=73), strongly agreed or agreed that they think praying and fasting would help them to manage diabetes, 27.6% disagreed or strongly disagreed that this was true, 48.2% (n=145) were uncertain.

Forty respondents, 13.3% (n=40), strongly agreed or agreed that they think consulting traditional healers would be their way to manage diabetes, 27.2% (n=82) disagreed or strongly disagreed, and more than half 59.5% (n=179) were uncertain.

A large majority, 90.3% (n=272), strongly agreed or agreed that consulting a medical doctor would be their way to manage diabetes; only 3.3% (n=10) disagreed or strongly disagreed, and 6.3% (19) were uncertain.

Only 18.3% (n=55) strongly agreed or agreed that seeking herbal medicines would be their way to manage diabetes, almost a third, 31.2% (n=94), disagreed with this statement, and slightly more than half, 50.5% (n=152), were uncertain.

More than a third, 39.9% (n=120), strongly agreed or agreed that eating vegetables and non-fat, non-sweet foods would be their way to manage diabetes; only 3% (n=9) disagreed or strongly disagreed, but more than half, 57.1% (n=172), were uncertain.

Only 4.4% (n=13) strongly agreed or agreed that they would combine traditional medicine and western medicine to manage diabetes, whereas more than half 61.1% (n=184) did not think this would be their way to manage the disease. The remainder, 34.6% (n=104), were uncertain.

4.4.4 Perceived risk

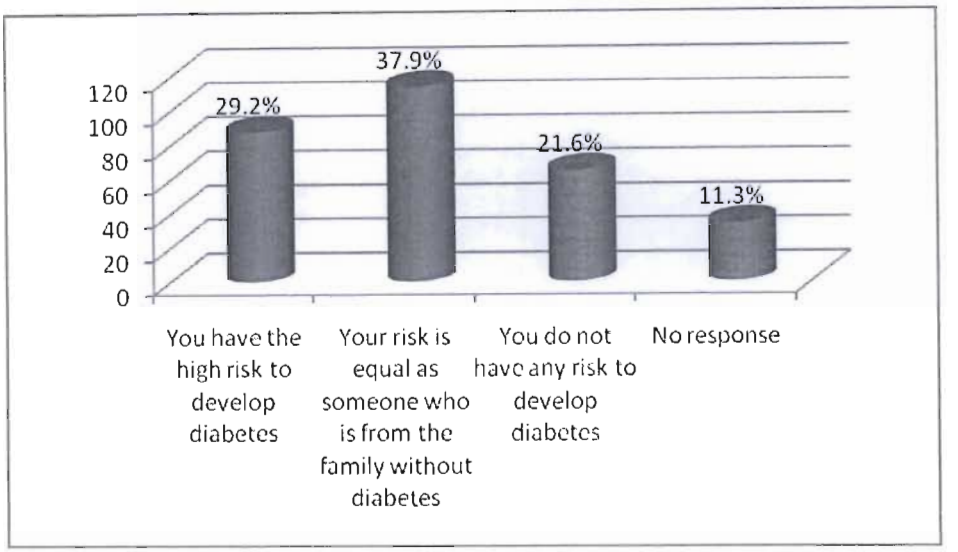

Figure 4-16: Perceived risk with diabetes in family(N=301)

More than a quarter, 29.2% (88), thought that the presence of diabetes in their family means that they have high risk of developing diabetes, 21.6% (n=65) believed that even if there is a diabetes in their family they are not at risk. More than a third 37.9% (n=114) believed that their risk of developing diabetes is the same as for someone who does not have diabetes in his/her family, and 11.3% (n=34) gave no reply.

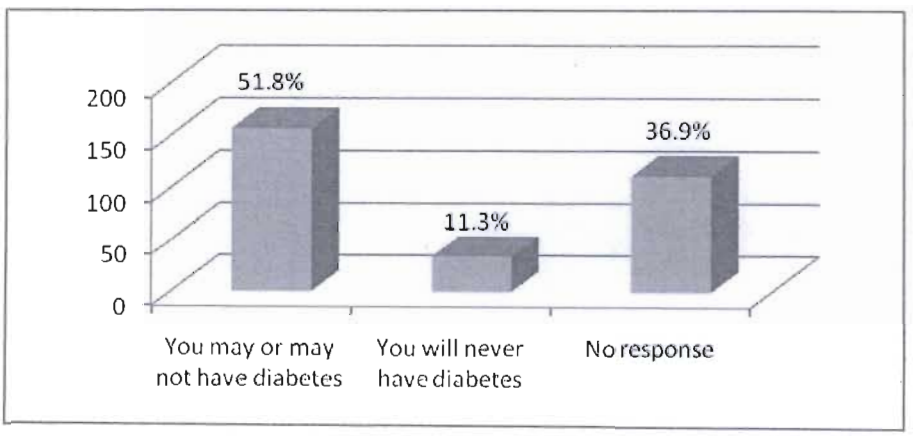

Figure 4-17: Perceived risk without diabetes in family (N=301)

More than half, 51.8% (n=156), thought that absence of diabetes in their family means that they may or may not develop diabetes, 11.3% (n=34) believed that because there is no

diabetes in their family they are not at risk of developing diabetes, and 36.9% (n=111) gave no response.

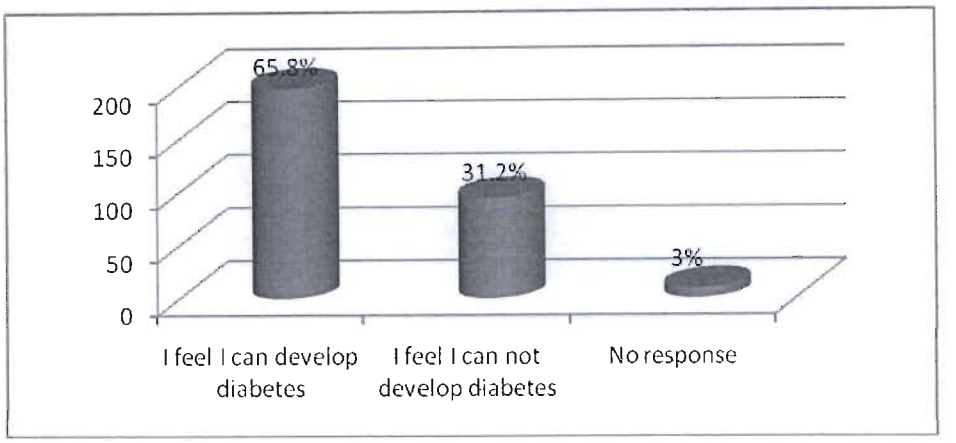

Figure 4-18: People's feelings about developing diabetes (N=301)

More than half, 65.8% (n=198), felt it was possible that they could develop diabetes, while 31.2% (n=94) felt they cannot develop diabetes: 3% (n=9) gave no reply.

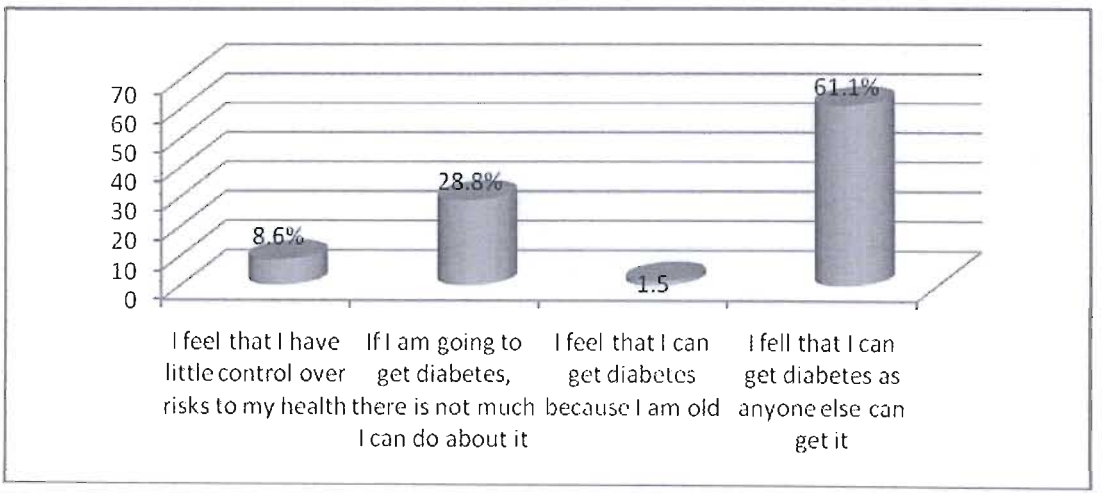

Figure 4-19: Why it would be possible to develop diabetes (N=198)

Respondents who believed it was possible that they could develop diabetes were asked why they believe this; 8.6% (n=17) felt that they had little control over risks to their health, 28.8% (n=57) felt that if they were going to have diabetes there is no much they could do about it, 1.5% (n=3) felt that they could develop diabetes because they are old, and more than two thirds, 61.1% (n=121), felt that they could develop diabetes just as anyone else could.

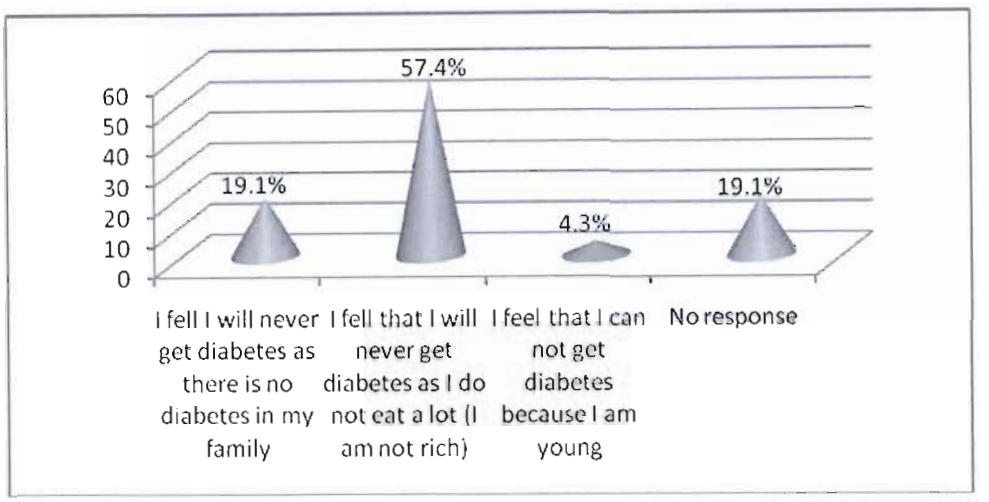

Figure 4-20: Why it would not be possible to develop diabetes(N=94)

When respondents who thought they will never develop diabetes were asked why this would be so, 19.1% (n=18) felt they will never develop diabetes because there is no diabetes in their family, 57.4% (n=54) felt that they will never develop diabetes because they are not rich (they do not eat a lot), 4.3% (n=4) felt that they cannot develop diabetes because they are young, and 19.1% (n= 18) gave no answer.

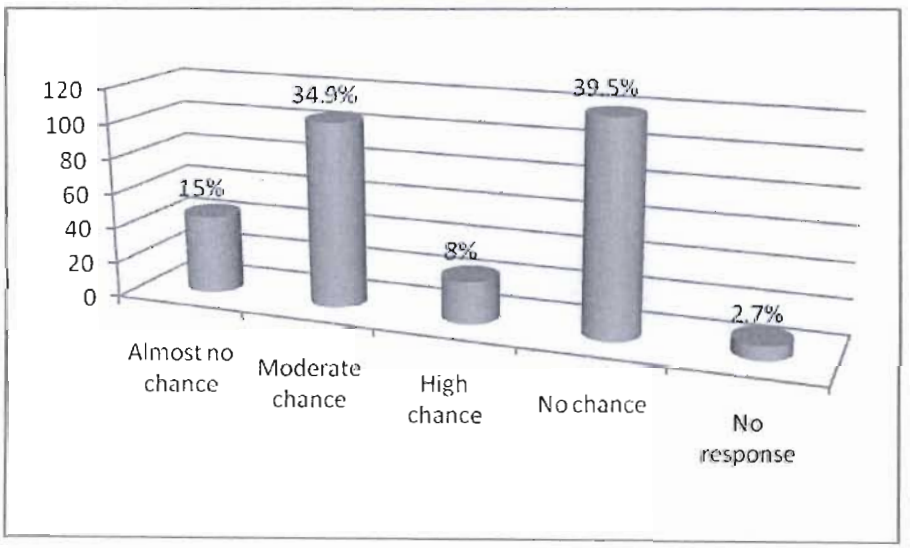

Figure 4-21: Perceived risk of developing diabetes in the next 10 years(N=301)

Forty-five respondents, 15% (n=45), felt that there was almost no chance of them developing diabetes in next 10 years, more than a third 34.9% (n=105) felt there was a moderate chance, only 8% (n=24) believed there was a high chance of them developing diabetes in next 10 years, but the largest number, 39.5% (n=119), felt there was no chance that they would. The remainder, 2.7% (n=8), gave no answer.

4.4.5 Perceptions of prevalence

Table 4.19: Perceptions of diabetes prevalence (N=301)

Prevalence	Strongly agree		Agree		Uncertain		Disagree		Strongly disagree		Total (N=301)	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Diabetes is increasing in the world	20	6.6	84	27.9	187	62.1	5	1.7	5	1.7	301	100
Diabetes is less frequent in Africa	10	3.3	32	10.6	236	78.4	21	7	2	0.7	301	100
Diabetes is less frequent in Rwanda	16	5.3	58	19.3	201	66.8	21	7	5	1.7	301	100
Diabetes is more frequent in Rwanda	8	2.7	22	7.3	231	76.7	23	7.6	17	5.6	301	100
Diabetes is more prevalent in America and rich countries	35	11.6	38	12.6	218	72.4	5	1.7	5	1.7	301	100
Men are more vulnerable than women	7	2.3	26	8.6	225	74.8	14	4.7	29	9.6	301	100
Elderly are more vulnerable	15	5	23	7.6	196	65.1	35	11.6	32	10.6	301	100

Just over a third of respondents, 34.5% (n=104), strongly agreed or agreed that they think diabetes is increasing in the world, while only 3.4% (n=10) disagreed or strongly disagreed. A majority, 62.1% (n=187), were uncertain.

Only 13.9% (n=42) strongly agreed or agreed that they believe diabetes is less frequent in Africa, and 7.7% (n=23) disagreed or strongly disagreed with this statement. A large majority, 78.4% (236), were uncertain.

Just under a quarter 24.6% (n=74) strongly agreed or agreed that they think diabetes is less frequent in Rwanda, while 8.7% (n=26) disagreed or strongly disagreed with this statement. The majority, 66.8% (n=201), were uncertain.

On whether they believe diabetes is more frequent in Rwanda, 10% (n=30), of respondents strongly agreed or agreed, 13.2% (n=40) disagreed or strongly disagreed, and the majority, 76.7% (=231), were uncertain.

Almost a quarter, 24.2% (n=73), strongly agreed or agreed that they think diabetes is more prevalent in America and rich countries, only 3.4% (n=10) disagreed or strongly disagreed, and the majority, 72.4 (n=218), were uncertain.

Only 10.9% (n=33) strongly agreed or agreed that they think men are more vulnerable to diabetes more than women, 14.3% (n=43) disagreed or strongly disagreed with this statement, and the majority 74.8% (n=225) were uncertain.

Thirty-eight respondents, 12.6% (n=38), strongly agreed or agreed that they believe the elderly are more vulnerable to diabetes more than young people, 22.2% (n=67) disagreed or strongly disagreed, and more than half 65.1% (n=196) were uncertain.

4.4.6 Perceptions about diabetes prevention

Table 4.20: Perceptions about diabetes prevention(N=301)

Perceptions about diabetes prevention	Strongly agree		Agree		Uncertain		Disagree		Strongly disagree		Total (N=301)	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Diabetes can be prevented	47	15.6	145	48.2	84	27.9	15	5	10	3.3	301	100
Preventing diabetes is very expensive	6	2	30	10	182	60.5	53	17.6	30	10	301	100
Preventing diabetes is only possible for rich people	24	8	18	6	154	51.2	65	21.6	40	13.3	301	100
Stop smoking can prevent diabetes	17	5.6	107	35.5	155	51.5	16	5.3	6	2	301	100
Low fat diets can prevent diabetes	33	11	154	51.2	98	32.6	11	3.7	5	1.7	301	100
Low intake alcohol can prevent diabetes	13	4.3	153	50.8	115	38.2	10	3.3	10	3.3	301	100
Diabetes screening is very important for preventing diabetes	61	20.3	131	43.5	104	34.6	2	0.7	3	1	301	100
Nothing can prevent diabetes because it is inherited disease	10	3.3	21	7	195	64.8	49	16.3	26	8.6	301	100

More than half the respondents, 63.8% (n=192), believed that diabetes can be prevented; only 8.3% (n=25) did not believe this is possible, and 27.9% (n=84) were uncertain.

Thirty-six respondents, 12% (n=36), strongly agreed or agreed that they think preventing diabetes is very expensive, while 27.6% (n=83) disagreed or strongly disagreed with this statement. More than one half 60.5% (n=182) were uncertain.

Only 14% (n=42) strongly agreed or agreed that they believe preventing diabetes is only possible for rich people, 34.9% (n=105) disagreed or strongly disagreed with this statement, and just over half 51.2% (n=154) were uncertain.

More than a third of the respondents, 41.1% (n=124), strongly agreed or agreed that they believe stop smoking may prevent diabetes; only 7.3% (n=22) disagreed or strongly disagreed, but more than half, 51.5% (n=155), were uncertain.

More than half, 62.2% (n=187), thought that low fat diets can prevent diabetes, only 5.4% (16) disagreed or strongly disagreed, and 32.6% (98) were uncertain.

More than half, 55.1% (n=166), strongly agreed or agreed that they think low alcohol intake can prevent diabetes, only 6.6% (n=20) disagreed or strongly disagreed, and 38.2% (n=115) were uncertain.

Almost two-thirds, 63.8% (n=192), believed that diabetes screening is very important for preventing diabetes, only 1.7% (n=5) did not believe in this statement, and 34.6% (n=104) were uncertain.

Thirty-one respondents, 10.3% (n=31), thought that nothing can prevent diabetes because is an inheritable disease, 24.9% (n= 75) disagreed or strongly disagreed, and a majority, 64.8% (n=195), gave no answer.

4.4.7 Perceptions about behaviour change

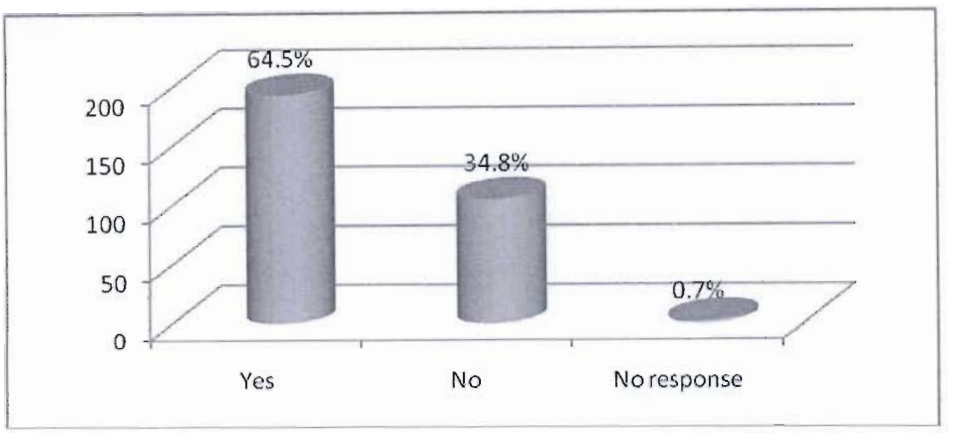

Figure 4-22: Perceptions about adopting health behaviour (N=301)

Respondents were asked if they think adopting health behaviour such as exercising, or quitting smoking would prevent them from developing diabetes. More than half, 64.5% (n=194), did believe that adopting a health behaviour would prevent diabetes, and more than a third 35.5% (n=105) did not believe this would prevent it; only 0.7% (n=2) gave no response.

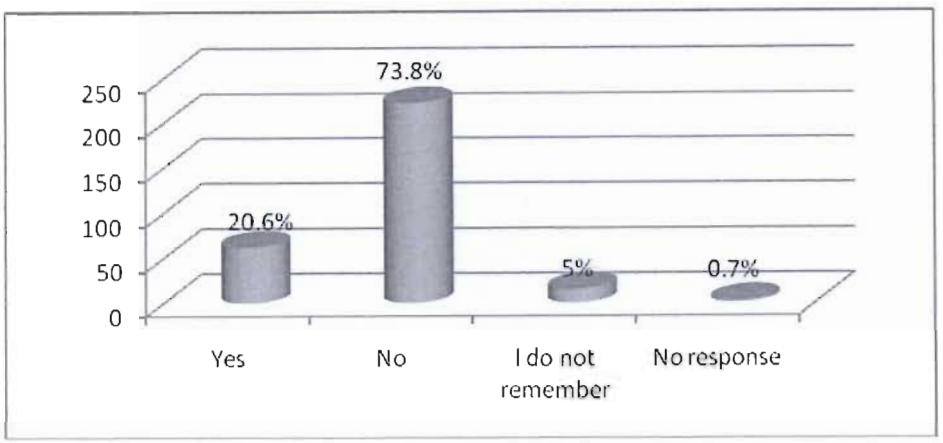

Figure 4-23 Recent behaviour change to prevent diabetes (N=301)

Respondents were asked if they have recently made changes in their behaviour that could prevent them from developing diabetes. Less than a quarter 20.6% (n=62) said yes and a large majority 73.8% (n=222) said no, while 5% (n=15) reported that they did not remember if they have ever changed their behaviour. Only 0.7% (n=2) gave no response.

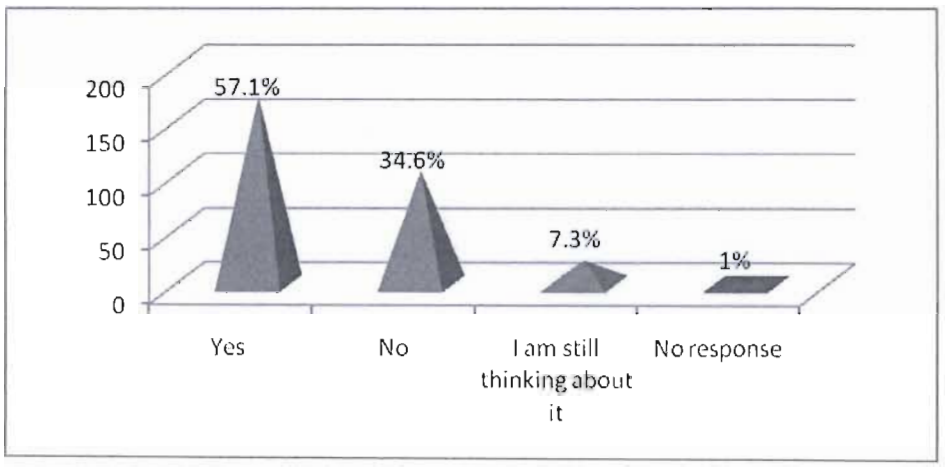

Figure 4-24: Future planning about behaviour change(N=301)

More than half the respondents, 57.1 (n=172), agreed about planning future behaviour change to prevent diabetes, while 34.6% (n=104) disagreed, 7.3% (n=22) replied that they were still thinking about it, and 1% (n=3) gave no response.

4.5 Results of cross tabulations

Table 4.21: Cross-tabulations: Biographical data / knowledge of diabetes

		Meaning			Types		
		Yes	No	Total	Yes	No	Total
Gender	Male	95	48	143	4	139	143
	Female	78	80	158	7	151	158
Age	18 years	7	19	26	1	25	26
	19-35 years	64	53	117	54	112	117
	36-45 years	67	30	97	1	93	97
	46-65 years	35	26	61	1	60	61
Family history of diabetes	Diabetes in my family	22	8	30	3	27	30
	No Diabetes in my family	151	120	271	8	263	271
Education level	None	18	30	48	1	47	48
	Primary	100	69	169	3	166	169
	Secondary	50	29	79	5	74	79
	Tertiary	5	0	5	2	3	5
Monthly income	≤1000 frw	14	17	31	2	29	31
	1000-1999 frw	4	9	13	1	12	13
	2000-2999frw	0	10	10	0	10	10
	3000-4999fw	4	10	14	0	14	14
	≥5000 frw	151	82	233	8	225	233

Table 4.22: Cross-tabulations: Biographical data / knowledge of diabetes

		Signs and Symptoms			Causes				Factors			
		Yes	No	Total	Yes	No	No response	Total	Yes	No	No response	Total
Gender	Male	86	57	143	96	38	9	143	55	87	1	143
	Female	70	88	158	84	71	3	158	60	97	1	158
Age	18 years	7	19	26	9	16	1	26	8	18	0	26
	19-35 years	56	61	117	67	46	4	117	49	67	1	117
	36-45 years	70	27	97	69	22	6	97	46	51	0	97
	46-65 years	23	38	61	35	25	1	61	12	48	1	61
Family history of diabetes	Diabetes in my family	18	12	30	18	10	2	30	16	14	0	30
	No Diabetes in my family	138	133	271	162	99	10	271	99	170	2	271
Education level	None	11	37	48	15	33	0	48	7	40	1	48
	Primary	89	80	169	109	57	3	169	53	116	0	169
	Secondary	52	27	79	51	19	9	79	51	27	1	79
	Tertiary	4	1	5	5	0	0	5	4	1	0	5
Monthly income	≤1000 frw	14	17	31	20	9	2	31	17	13	1	31
	1000-1999 frw	4	9	13	3	8	2	13	4	9	0	13
	2000-2999 frw	0	10	10	0	10	0	10	0	10	0	10
	3000-4999 frw	4	10	14	4	10	0	14	4	10	0	14
	≥5000 frw	134	99	233	153	72	8	233	90	142	1	233

Cross-tabulation was done to identify the knowledge of diabetes by socio-demographic data of respondents. The results are presented in two tables (Table 4.21 and Table 4.22.)

According to these two tables (Tables 4.21 and 4.22), almost all the male participants, (n=139) of the 143 who participated in the study did not know the types of diabetes; similarly, of 158 women who participated in the study, almost all, (n=151), had no knowledge about types of diabetes.

The tables show that the majority of participants aged 18 and between 19 and 35 did not have knowledge about the meaning of diabetes, types, signs/symptoms, causes or risk factors.

The tables indicate that the participants aged between 36 and 45 had better knowledge of meaning of diabetes, signs/symptoms, and than they did of types of diabetes and risk factors. Of (N=97) participants who were in this age category, a majority (n=67) reported that they knew the meaning of diabetes, and a majority (n=70) also answered that they had knowledge

about signs/symptoms of diabetes, as well, a further majority (n=69) replied that they knew the causes of diabetes; But a majority (n=93) also answered that they did not have any knowledge about types of diabetes; in addition, a large proportion (n=51) did not know any risk factors of diabetes.

A majority (n=60) out of (N=61) participants aged between 46 and 65 did not know the types of diabetes, as the same, a big proportion (n=48) of this age category were not aware of the risk factors. In general, the majority of participants of all age categories responded that they did not know the types of diabetes or the risk factors.

Of the 30 participants who had diabetes in their families, a majority (n=27) did not know the types of diabetes, and 14 did not know the risk factors.

The majority of participants who did not have diabetes in their families did not have knowledge of diabetes; almost a half, (n=120) out of (N=271), did not know the meaning of diabetes, a large majority (n=263) did not have knowledge about types of diabetes, a considerable proportion (n=133) did not know any signs/symptoms of diabetes and a majority (n=170) did not know any risk factor.

The majority of participants who had no educational level had no knowledge about the meaning of diabetes, or its signs/symptoms, causes, or factors.

The tables also indicate that a large majority of participants, (n=166) out of (N=169), with a primary school educational level had no knowledge about types of diabetes, and a substantial proportion (n=116) did not know the risk factors. A majority of participants, (n=74) out of (N=79), who had a secondary school level education also had no knowledge about types of diabetes. Participants with tertiary education level had better knowledge of the meaning of diabetes, signs/symptoms, causes and risk factors, but out of (N=5) participants, (n=3) did not know the types of diabetes.

The tables show that the majority of participants in all categories of monthly income had no knowledge about the types of diabetes and risk factors. Participants in the 2000-2999 monthly income categories did not have any knowledge of diabetes.

There was a statistically significant association between gender and knowledge of the meaning of diabetes (p=0.003), and there was also a significant association between age and knowledge of the meaning of diabetes (p=0.001)

According to the chi-square test, there was a statistically significant association between educational level and knowledge about types of diabetes, signs/symptoms of diabetes, causes of diabetes and risk factors (p=0.000). The chi-square test also revealed a significant association between educational level and knowledge about available medicines for diabetes (p=0.023).

The was no significant association between family history of diabetes and knowledge of the meaning of diabetes (p=0.064), nor did the chi-square test find any significant association between family history of diabetes and knowledge about types of diabetes (p=0.51). Furthermore there was no statistically significant association between family history of diabetes and knowledge of signs and symptoms of diabetes (p=0.34), and the chi-square test did not found any significant association between family history of diabetes and awareness about risk factors (p=0.18).

Table 4.23: Cross-tabulations: Biographical data / knowledge of diet, urgent help, diabetes risk

		Diet				Immediate help during coma			Risk of developing diabetes			
		Yes	No	No response	Total	Yes	No	Total	Yes	No	No response	Total
Gender	Male	22	**121**	0	143	8	**135**	143	99	38	6	143
	Female	26	**131**	1	158	6	**152**	158	99	**56**	3	158
Age	18 years	8	**17**	1	26	1	**25**	26	9	**17**	0	26
	19-35 years	24	**93**	0	117	7	**110**	117	**74**	39	4	117
	36-45 years	11	**86**	0	97	4	**93**	97	**80**	15	2	97
	46-65 years	5	**56**	0	61	3	**58**	61	35	**23**	3	61
Family history of diabetes	Diabetes in my family	9	**21**	0	30	7	**23**	30	**23**	6	1	30
	No diabetes in my family	39	**231**	1	271	8	**263**	271	**175**	88	8	271
Education level	None	1	**47**	0	48	0	**48**	48	19	**29**	0	48
	Primary	11	**157**	1	169	4	**165**	169	117	**44**	8	169
	Secondary	32	**47**	0	79	8	**71**	79	**57**	21	1	79
	Tertiary	4	1	0	5	3	2	5	**5**	0	0	5

The table indicates that the majority of men participants (n=121) and of women participants (n=131) did not know what diet to advise for a diabetic, and almost all men participants (n=135) and women participants (n=152) did not know how to help a diabetic in coma.

Furthermore the table indicates that more than a third of women participants (n=56) believed that there was no risk for them of developing diabetes.

A majority of participants aged 18 (n=17) did not know what diet to advise for a diabetic, and also almost all of them (n=25) did not know how to help a diabetic in coma. More than a half (n=17) thought that there was no risk for them of developing diabetes.

A large majority (n=93) of participants aged between 19 and 35 did not know what diet to advise for a diabetic, and a larger majority (n=110) did not know how to help a diabetic in coma. However more than half (n=74) of participants in this age category felt that there was a risk for them of developing diabetes.

More than half (n=86) of participants aged between 36 and 45 did not know what diet to advise for a diabetic, and a larger proportion (n=93) did not know how to help a diabetic in coma However a majority (n=80) of participants in this age category felt that there was a risk for them of developing diabetes.

Most participants (n=56) aged between 46 and 65 did not know what diet to advise for a diabetic, even more (n=58) did not know how to help a diabetic in coma, and more than a third (n=23) believed that there was no risk for them of developing diabetes.

A majority (n=21) of participants who had diabetes in their families did not know what diet to advise for a diabetic, and a large proportion (n=23) did not know how to help a diabetic in coma. On the other hand an equally large proportion (n=23) believed that there was a risk for them of developing diabetes.

A large majority (n=231) of respondents who had no diabetes in their families did not know what diet to advise for a diabetic, and a larger majority (n=263) did not know how to help a diabetic in coma. However, a majority (n=175) thought there was a risk for them of developing diabetes.

Almost all (n=47) respondents who had no education did not know what diet to advise for a diabetic, and all of them (n=48) did not know how to help a diabetic in coma. The majority (n=29) believed that there was no risk for them of developing diabetes.

A vast majority (n=157) of respondents who had a primary education did not know what diet to advise for a diabetic, and a large proportion (n=165) did not know how to help a diabetic in

coma. However a majority (n=57) believed that there was a risk for them of developing diabetes.

All (n=5) who had a tertiary educational felt that there was a risk for them of developing diabetes. Nearly all (n=4) knew what diet to advise for a diabetic, and more than half (n=3) knew what to do during coma.

The chi-square test found significant association between educational level and the knowledge of immediate help during coma (p=0.000).

There was no significant association between family history of diabetes and knowledge of a diet (p=0.83), but the chi-square test did find significant association between family story of diabetes and immediate help during coma (p=0.000)

Table 4.24 Cross-tabulations: awareness of risk factors / knowledge of diabetes prevention / recent behaviour change

		Prevention of diabetes				Recent behaviour change				
		I know	I do not know	No response	Total	Yes	No	I do not remember	No response	Total
Awareness about risk factors	Yes	**88**	22	5	115	22	**83**	9	1	115
	No	21	**162**	1	184	39	**138**	6	1	184
	No response	0	1	1	2	1	1	0	0	2
Total					301					301

A majority (n=88) of participants who said they were aware of risk factors agreed that they knew how to prevent diabetes, however a large proportion (n=83) of the same participants reported that they had not made any recent behaviour change that could help to prevent diabetes.

A large proportion (n=162) of respondents who said they were not aware of risk factors increasing the possibility of diabetes did not know how to prevent diabetes, and a majority (n=138) had not made any recent behaviour change could help to prevent diabetes.

There was a statistically significant association between awareness about risk factors and knowledge of diabetes prevention (p=0.000), however the chi-square test did not find any significant association between awareness of risk factors and recent behaviour change (p=0.6).

Table 4.25: Cross-tabulation: family history / perceived risk in next 10 years

		Risk of developing diabetes in next 10 years					
		Almost no chance	Moderate chance	High chance	No chance	No response	Total
Family history of diabetes	Diabetes in family	**9**	8	3	**9**	1	30
	No diabetes in family	**36**	97	21	**110**	7	271
Total							301

A majority (n=18) of participants who had diabetes in their families felt that they had almost no chance or no chance to develop diabetes in next 10 years. Also a vast majority (n=146) of respondents who had not diabetes in their families believed that they had almost no chance or no chance of developing diabetes in next 10 years.

The chi-square test did not find any significant association between family story of diabetes and the risk perceptions of developing diabetes in next 10 years (p=0.15).

Table 4.26: Cross-tabulation: Family history / future planning of behaviour change

		Future planning about behaviour change				
		Yes	No	I am still thinking	No response	Total
Family history of diabetes	Diabetes in family	8	**18**	3	1	30
	No diabetes in family	**164**	86	19	2	271
	Total					301

More than half (n=18) of participants who had diabetes in their families answered that they were not planning any behaviour change for preventing diabetes. However a majority (n=164) of respondents who did not have diabetes in their families replied that they were planning to change their behaviour in the future in order to prevent diabetes.

There was a significant association between family history of diabetes and the planning of behaviour change in the future (p=0.003).

4.6. Conclusion

This chapter discussed the data analysis and findings. Data was presented in tables and figures and the relationship between variables was explored using the contingency tables.

Chapter 5
Discussion, recommendations, and conclusion

5.1 Introduction

The aim of this chapter is to discuss the findings, make necessary recommendations and briefly discuss the limitations of the study and then conclude, in line with the objectives of the study. The literature reviews as well as findings from studies done by other researchers have been used in this discussion. The necessary recommendations are made.

Altogether 301 people (47.5% male and 52.5% female) completed the questionnaires. The respondents were aged between 18 and 65, with the majority between 36 and 65. The largest group of participants were single followed by married participants; with the remainder divorced, widowed or in a cohabitation relationship. A small minority of participants had diabetes in their family; most did not report any family history of the disease. Few people had a tertiary level of education, while the largest proportion had a primary school level of education. The majority had a monthly income of 5000 frw or more.

5.2 Discussion

5.2.1 Rwamagana residents' level of knowledge of diabetes.

In this study more than half of participants answered that they knew the meaning of diabetes, Nevertheless it was established that only 0.6% (n=1) responded correctly to the question intended to explore participants' knowledge regarding the definition of diabetes. In the study done by Shafee et al. (2008), 56.8% of participants reported that they were aware of the

meaning of the condition called diabetes, but when they were asked to define it only 46.5% were able to give at least a rudimentary definition. In addition, Soltanian et al. (2007) found that awareness about the fundamentals of diabetes, such as definition, signs and complications, was not high among participants in their study done among Bushehr port inhabitants.

In the current study, about half the participants said that they knew the signs/symptoms of diabetes, and most of them mentioned the constant feeling of thirst as a major sign of the disease; only few participants mentioned weight loss as a sign of diabetes. However even if some participants in our study knew some signs/symptoms of diabetes, their knowledge was low since only 1.3% (n=2) recorded the maximum score for the question aimed to identify the people who knew the signs/symptoms of diabetes. These findings are consistent with the results from the study done by Shafee et al. (2008) who discovered that more than half (57.0%) of participants knew at least one of the classical symptoms of diabetes, like polyuria, polydipsia or unexplained weight loss. However, Soltanian et al. (2007) and Wee, Ho and Li (2002) found that over half of subjects knew none of the primary symptoms.

Only 0.6% (n=1) of the respondents in the present study got the top score on the question intended to investigate participants' knowledge regarding the causes of diabetes. This indicates a significant ignorance of the causes of diabetes among the population of Rwamagana district. Similarly Kiawi et al. (2006) and Murugesan et al. (2007) found that awareness of T2DM and knowledge of its causes, clinical course, and complications were limited among respondents.

The findings from this study revealed that only 0.9% (n=1) were able to score the higher mark in the question intended to identify the people who knew the risk factors for diabetes. This is an evident lack of knowledge of risk factors among participants in current study. Ignorance of risk factors for diabetes may impede preventative efforts such as the adoption of positive lifestyle changes among the residents of Rwamagana district. A knowledge-based perception of personal risk for the disease appears therefore to be an important factor in various preventative health behaviours. Muninarayana et al. (2010) have related the increase in T2DM and its complications to lack of public knowledge about T2DM, especially lack of knowledge about risk factors for T2DM and about prevention methods. Shafaee et al. (2008) also found a lack of awareness of major risk factors for T2DM in the semi-urban Omani population. However, in their study done in North Malaysia Yun et al. (2007) found that

patients with T2DM were significantly more knowledgeable about risk factors than the healthy volunteers.

Obesity, excessive sugar intake, less active lifestyle and high alcohol intake were the main risk factors enumerated by the participants in our study who answered that they knew some risk factors of diabetes. Participants in the study by Shafaee, et al. (2008) reported the same risk factors.

In this study it was found that only 0.3% (n=1) knew how to manage diabetes at the community level. This findings are supported by Hughes & Bradley (2006), who discovered that while community health workers (CHWs) – lay personnel employed to serve as a link between professional healthcare staff and the community – can be a powerful force for T2DM prevention and adherence to treatment regimens in the communities, the big issue is that they did not have the requisite knowledge, attitudes and beliefs to make a positive impact on prevention and management of T2DM.

The findings of the present study disclosed that not more than 2.8% (n=3) correctly answered the question aimed to identify the participants who knew how to prevent diabetes. These findings are confirmed by the results of the study done in Southern India by Murugesan et al. (2007), who stated that knowledge regarding causes of T2DM, its prevention and the methods to improve health was significantly low among participants. Furthermore Muninarayana et al. (2010) stated that the increasing prevalence of T2DM and its complications is related to popular ignorance about T2DM and how it could be prevented.

Concerning knowledge of available medicine for diabetes, very few participants could name insulin as the medicine for diabetes. According to the IDF (2009), among the many problems identified during a preliminary survey on diabetes care in Rwanda were lack of health care professionals, lack of diabetes training, difficulty in accessing diabetes care, and inadequate availability of medication such as insulin and other diabetes supplies. On the other hand, Sircar et al. (2009) discovered that among patients of poorly-controlled T2DM and their close family members there was a gross lack of knowledge about treatment of diabetes and use of insulin.

The findings show that only 1.7% (n=5) participants mentioned a local diabetic association as an emotional support resource, while only 0.3% (n=1) reported that they knew how to manage diabetes at the community level. These findings are consistent with the results from

the study done by Tessaro et al. (2005) in West Virginia, who discovered that there was lack of knowledge about T2DM management among participants. According to Gishoma (2006), at the community level, the Rwandan Diabetic Association has established local diabetic associations in districts for patients to seek support regarding treatment, education and counselling. However, the results from the present study disclosed that the participants had no knowledge about the local diabetic association as a source of emotional support for diabetics who need diabetes management at the community level.

The current study revealed that knowledge about diet for diabetics was low; only 15.9% (n=48) answered that they were able to advise on diet for a diabetic. Foods without salt, no sugar, no alcohol and no oil were the healthier diets reported. Surprisingly, vegetables were mentioned by very few participants. Based to the literature about popular knowledge concerning T2DM, lack of knowledge is not only a barrier to early detection of the disease but also the cause of poor self-management by diabetics, which is the key element in T2DM management. This finding does not correspond with the results from the study done by Soltanian et al. (2007), who found that subjects' dietary awareness was moderate, since approximately half of subjects (52.3%) knew at least six dietaries. Yun et al. (2007) demonstrated that patients with T2DM were significantly more knowledgeable about treatment and self-management than the healthy volunteers.

Regarding how to help a diabetic in coma, very few 5% (n=15) in this study answered that they knew how to help. The majority of participants who reported that they knew how to help a diabetic in coma answered that they would take him/her to hospital as soon as possible. In their study done in Pakistan, Sabri et al. (2007) have shown that most people are unaware of T2DM and its complications, hence most of them consult the hospital in the last stage of the disease with complications.

There was a statistically significant association between gender and knowledge of diabetes regarding the meaning of diabetes (p=0.003), and also a significant association between age and knowledge of the meaning of diabetes (p=0.001).

There was a statistically significant association between educational level and knowledge about types of diabetes, signs/symptoms of diabetes, causes of diabetes, and risk factors (p=0.000). The chi-square test also revealed a significant association between educational level and knowledge about available medicines for diabetes (p=0.023).

There was no significant association between family history of diabetes and knowledge of the meaning of diabetes (p=0.064). Furthermore, the chi-square test did not find any significant association between family history of diabetes and knowledge about types of diabetes (p=0.51), nor was there any statistically significant association between family history of diabetes and knowledge of signs and symptoms of diabetes (p=0.34). In addition the chi-square test found no significant association between family history of diabetes and awareness about risk factors (p=0.18).

There was no significant association between family history of diabetes and perceptions of risk of developing diabetes in the next 10 years (p=0.15). However there was a significant association between family history of diabetes and the planning of changed behaviour in the future (p=0.003).

These results reflect findings from other studies: Shafee et al. (2008) revealed that those with a high school education or higher were 4.69 times more likely to know the definition of diabetes than those with a lower level of education ($p < 0.001$). Higher education level also was significantly associated with greater knowledge regarding diabetes symptoms ($p < 0.001$)), risk factors ($p < 0.001$), complications (< 0.001) and prevention ($p < 0.001$). Positive family history of diabetes also predicted each of these response variables. Furthermore, Murugesan et al. (2007) found that age influenced knowledge on physical activity; gender, level of education and occupation positively influenced knowledge on physical activity, complications and prevention of diabetes; in women and subjects with lower education, labourers and unskilled workers, awareness about diabetes was low. Moreover Soltanian et al. (2007) found in their study that there was significant direct association between people's awareness level and their education.

5.2.2 Perceptions of causes, complications and treatment of diabetes.

In this study a large majority of the participants perceived unhealthy food intake, such as excess sugar intake, as a cause of diabetes; more than half regarded unhealthy behaviour such as excessive smoking as a cause of diabetes; and a few perceived genetic factors as a cause of diabetes. These findings are consistent with the results from the study done by Leandris, Liburd, Funa, and Gregg (2004), who found that the majority of their participants identified poor diet (particularly a diet high in refined sugars) as the principal reason they developed diabetes, some participants mentioned heredity, and others said both a genetic predisposition

and poor diet were the reasons they developed diabetes. Shafaee et al. (2008) found likewise that about 59.9% of participants perceived high consumption of dietary sugar as an important risk factor for developing diabetes. All informants in the study done by Greenhalgh and Helman (1998) believed that the primary cause of diabetes, and of poor diabetic control, was too much sugar. Hughes and Bradley (2006) discovered that almost all respondents felt that too much sweet food was a cause of diabetes, while approximately one-third mentioned genetic endowment (37%).

Conversely, findings from other studies disclosed that genetic susceptibility was the main cause of diabetes perceived by participants, ahead of other causal factors such as unhealthy food intake. Pijl et al. (2009) and Skelly et al. (2006) revealed that the role of genetic susceptibility as a cause for diabetes was more pronounced when people perceived diabetes as "running in the family"; behavioural causes such us unhealthy food (too much fat and sugar, unvaried diet), lack of physical activity, and alcohol intake were perceived by a few participants as causes of diabetes. In the study by Debussche et al. (2006), heredity was cited as a causal factor of diabetes by more participants (36% of males and 29% of females) and sugar was only linked to diabetes in 38% of cases.

The findings from the present study revealed that obesity was perceived as a cause of diabetes by more than a third of the participants. However very few individuals (3.2%) linked diabetes to excess weight in the study done by Debussche et al. (2006). Skelly et al. (2006) also found that weight excess was not seen by their participants as contributing to the development of diabetes. In their study, Frank et al. (2001) discovered that the participants did not recognize the connection between overweight or obesity and diabetes. But the same authors (Frank et al., 2001), in their study exploring the risk of type 2 diabetes mellitus in women, found that excess body fat was the single most important determinant of type 2 diabetes and that weight control would be the most effective way to reduce the risk of type 2 diabetes. In addition, Lean, Powrie, Anderson and Garthwaite (1990) discovered that for the average diabetic patient, each 1 kg weight loss was associated with 3 to 4 months prolonged survival.

The findings of this study revealed that more than a third of participants believed that diabetes is caused by the will of God. This is consistent with the findings of Barnes et al. (2004) and Greenhalgh and Helman (1998), who found that God's will was perceived by their participants as one of the main causes of diabetes.

Very few people in the current study felt that age causes diabetes. Nevertheless, age was among the main causal factors of diabetes perceived by the participants in the study done by Pijil et al. (2009).

Only 4% (n=12) believed that diabetes is caused by socioeconomic factors such as poverty, or stress. Conversely, Greenhalgh and Helman (1998) and Debussche et al. (2006) found that many participants felt that socioeconomic factors such as financial difficulties, poverty, physical or psychological stress, as well as life events cause diabetes.

In the current study, a large majority, 79.4% (n=239), thought that diabetes is a severe disease; more than a third of participants saw diabetes as a severe disease but manageable, only few saw it as fatal. However other studies found that diabetes was perceived by majority of participants as an uncontrollable disease synonymous with death. Kathryn et al. (2004) found that almost all women presented a fatalistic view of diabetes, perceiving the disease as an inevitable event that destroys health and ultimately results in death. Furthermore, Debussche et al. (2006) and Yun et al. (2007) discovered that diabetes was predominantly perceived among participants as potentially acute, with risk of coma and death.

The results from the present study disclosed that more than a third of participants regarded diabetes as a simple disease of rich or old people. This is consistent with the findings of Lamont (2002) who found that most participants perceived diabetes as less frightening than other diseases, for example cancer. Also Dunning and Martin (1997) discovered that most participants regarded type two diabetes as not serious because they did not associate it with insulin injections.

In this study, few participants thought that diabetes would be cured by western medicine. Lam (2001) discovered that many participants did not appreciate the use of western medicine to treat diabetes; they said that western medicines are not satisfactory for treating diabetes because of their side effects. On the other hand, Hughes and Bradley (2006) found that almost all participants (40 out 43) believed that medical treatment cures diabetes.

Very few participants in the current study believed that diabetes can be cured with traditional medicines or by traditional healers. This is confirmed by Hughes and Bradley (2006) who reported community health workers as stating that few people believed in traditional doctors for diabetes treatment. However, Lam (2001) found that many Chinese participants believed that their Chinese traditional medicines are more effective, without side effects like those

produced by western medicine. Furthermore Rafique et al. (2006) argued that the use of traditional remedies is prevalent in many cultures.

In the current study more than a third of participants strongly agreed or agreed that if they had diabetes their way to manage it would be to see traditional healers or to seek herbal medicines. Ntambara (2008) stated that most Rwandans continue to consult traditional healers as they believe in traditional medicine. Debussche et al. (2006) revealed that many participants (49%) used herbs to manage their diabetes; the perception of insulin was negative in 67% of cases (useless 2%, dangerous 13%, uneasy 14%, constraining 38%). Nevertheless Kishore (2009) and Hughes and Bradley (2006) reported that only a few participants believed that herbal medicines or traditional healers would help them to manage diabetes.

A large proportion of respondents in the current study strongly agreed or agreed that consulting a doctor would be their way to manage diabetes if they were diabetics. Hu, et al. (2001) found that for management of diabetes, a majority (81.3%) of participants responded that they were seeing the doctor for drugs; lifestyle interventions, namely nutrition and exercise, were the cornerstones of successful diabetes therapy too. Mukhopadhyay, Paul, Das, Sengupta and Majumder (2010) also found that drugs and dietary modification were the most common management options, reported by 52 patients (81.3%) and 46 patients (71.9%) respectively.

In this study several respondents, 24.3% (n=73), strongly agreed or agreed that they think prayer and fasting would be their way to manage diabetes if they were ever sick. This is consistent with the findings of Kishore (2009) who reported that some participants insisted that diabetes is cured by prayer, since for them the disease is a result of past sins of people who contract it.

The findings from this study revealed that more than a third of participants strongly agreed or agreed that they believe they would manage diabetes by eating vegetables and non-fat, non-sweet foods. Similarly Hughes and Bradley (2006) reported that a number of participants (42%) believed that avoiding sugar is important in managing diabetes, and 21% felt that eating a lot of vegetables would help them to manage diabetes. Mukhopadhyay et al. (2010), Hu, et al. (2001) and Lam (2001) discovered that many participants believed that dietary modification is very important in diabetes management.

5.2.3 Perceived risk among Rwamagana residents of developing diabetes

This study discovered that the majority of participants believed that the risk of developing diabetes for someone who has diabetes in his/her family is the same as for someone who does not have diabetes in his/her family, and several participants felt that even if there was diabetes in their family, there is no risk for them of developing the disease; only a few respondents thought that the presence of diabetes in their family means that they are at high risk of developing diabetes. A majority of respondents who had diabetes in their family also felt that there was almost no chance or no chance at all, of them developing diabetes in the next 10 years. This implies low perceived risk of developing diabetes among participants in the present study. This is consistent with the findings of Pijil et al. (2009) who found that even participants with diabetes in their family did not seem to associate that with their own risk; only 4 of 9 participants with a positive family history perceived a slightly higher risk for themselves in comparison with other people without diabetes in their family. Shafaee et al. (2008) discovered that recognizing the presence of a family history as a significant risk factor for developing diabetes was infrequent among subjects. In addition, Pierce, Ridout, Harding, Keen and Bradley (2000) found that the family members of individuals with type 2 diabetes underestimated their own risk of developing the disease.

On the other hand, Harwell et al. (2001) found that among participants of their study family history is the factor most significantly associated with perceived risk of developing diabetes.

The findings of this study revealed that almost a third of participants felt that they cannot develop diabetes; when asked why, the majority felt that they will never develop diabetes because they are not rich. Only a few participants felt that they will never develop diabetes because there is no diabetes in their family. This shows that most participants in this study did not perceive a low risk because of absence of diabetes in the family. However, Pijil et al. (2009) revealed that the absence of diabetes in the family was often cited as a reason for perceiving low risk. Most of their participants without a family history perceived a low risk of developing diabetes.

The findings from this study discovered that a majority of participants thought that there was almost no chance, or no chance at all that they would develope diabetes in next 10 years. Only a very few thought that there was a high chance of developing diabetes in next 10 years. The risk of developing diabetes was felt to be low or nonexistent in the study done by Wang

et al. (2009) who discovered that almost all participants perceived a higher risk of developing cancer and heart diseases than of developing diabetes. Pinelli, Berlie, Slaughter and Jaber (2009) also found that pharmacists exhibited a slight to moderate risk perception for developing diabetes.

5.2.4 Popular perceptions regarding diabetes prevalence, prevention and behaviour change in Rwamagana district.

The current study found that the majority of participants did not perceive diabetes as widely prevalent. According to the literature, however, diabetes is increasingly prevalent worldwide. The IDF (2006) has reported that about 250 million people around the world have diabetes and this number could rise to 380 million by 2025 if action is not taken. Khemlani (2008) reported that in 2007 the five countries with the largest numbers of people with diabetes were India (40.9 million), China (39.8 million), the United States (19.2 million), Russia (9.6 million), and Germany (7.4 million); the highest rate of diabetes prevalence was found in the North American region (9.2 percent) followed by the European region (8.4 percent). Bakris and Ritz (2009) stated that by 2025 the number of people with diabetes is expected to more than double in South-East Asia, the Eastern Mediterranean and Middle East, and Africa; it was projected to rise by nearly 20% in Europe, 50% in North America, 85% in South and Central America and 75% in the Western Pacific region.

The results from the present study revealed that the majority believed that diabetes can be prevented. The main ways to prevent diabetes were diabetes screening, low-fat diets, low intake of alcohol and stopping smoking. These findings are similar to findings from other studies. Frank et al. (2001) found that approximately 78.9% of the study sample perceived diabetes as a preventable condition; and healthy diet was believed to be the most common lifestyle factor that could prevent the disease, and 42.3% felt that diabetes can be prevented by increasing physical activity. Mukhopadhyay et al. (2010) found that healthy diet was believed to be the most common lifestyle factor that could prevent the disease (82.8%). Furthermore Khemlani (2008) stated that up to 80% of type 2 diabetes was preventable by adopting a healthy diet and increasing physical activity.

However, in all those studies (Frank et al., 2001; Mukhopadhyay et al., 2010; Khemlani, 2008) diabetes screening was not perceived as an important factor in preventing diabetes,

whereas it in this study more than half of the participants felt that diabetes screening is very important in preventing diabetes.

Most participants in the current study agreed that they have never made any change in their health behaviour able to prevent diabetes, and more than a third said that they were not planning any behaviour change in the future. This is consistent with the findings of Debussche et al. (2006) who reported that only a few participants were willing to change their nutritional habits in order to prevent diabetes.

Cross-tabulation showed that 83 participants out 88 who answered that they were aware of risk factors reported that they had not made any recent behaviour change able to prevent diabetes, and 138 participants out of 162 who answered that they were not aware of risk factors replied that they had not made any behaviour change. There was no significant association between awareness of risk factors and recent behaviour change made by participants ($p=0.6$).

Based on the results from cross tabulation, more than half ($n=18$) of participants who had diabetes in their family answered that they were not planning any behaviour change in order to prevent diabetes. However a majority ($n=164$) of respondents who had no diabetes in their families replied that they were planning to change their behaviour in the future in order to prevent diabetes. There was a significant association between family history of diabetes and planning behaviour change in the future ($p=0.003$). These findings indicate that the participants in this study who had diabetes in their family did not feel at high risk of developing diabetes which could influence them to adopt healthy behaviour. Similarly, Leandris et al. (2004) found that although the participants had diabetes in their family they did not mention having beliefs about being able to prevent the onset of diabetes or having taken any actions that might offset their chances of developing the disease; and once diagnosed many participants struggled to change established eating habits, even though they knew they should change to healthier behaviour.

5.3 Recommendations

Based on the findings of this study and literature review, the researcher would like to make recommendations for practice and further research.

5.3.1 Recommendations for practice

For authorities of Rwamagana district and local diabetic association

Education campaigns: The researcher recommends that the authorities of Rwamagana district with its local diabetic association should plan and conduct education campaigns for raising awareness about diabetes among the people of Rwamagana district. These campaigns should address all aspects of diabetes (meaning, causes, signs/symptoms, treatment/management and prevention, risk of developing diabetes and importance of behaviour change).

Awareness of local diabetic association: The researcher recommends that the local diabetic association in Rwamagana district should conduct an open day awareness event to publish its existence and activities. This will help the diabetic and non-diabetic people in Rwamagana district to seek support, counselling and advice from their local diabetic association.

Available pamphlets about diabetes: The researcher suggests to the authorities of Rwamagana district, together with the local diabetic association, to distribute pamphlets about diabetes in all health centres in Rwamagana district.

For Ministry of Health and the National Diabetic Association

Educational programs: The researcher recommends to the Ministry of Health and the National Diabetic Association that they should plan educational programs for diabetes education and make them available in Rwamagana district for reference during education campaigns.

Training of community health workers: The researcher suggest to the Ministry of Health and the National Diabetic Association that they should plan and implement training of community health workers in Rwamagana district on all aspects of diabetes, especially diabetes management at the community level. According to the literature, community health workers play an important role in community education in Rwanda.

Integration of traditional medicine: The Ministry of Health together with the National Diabetic Association should plan how to integrate traditional medicine in diabetes management. The findings from this study of popular perceptions revealed that many people rely on traditional medicine and traditional healers for diabetes management.

5.3.2 Recommendations for further research

- The researcher recommends that the Ministry of Health should conduct a nation-wide survey of diabetes prevalence and levels of public knowledge and perceptions of this disease in Rwanda. Establishing prevalence, knowledge and perceptions of diabetes in Rwanda will provide useful information for diabetes prevention programs.

- The current study did not explore in depth the factors influencing knowledge of diabetes, but knowing and understanding these factors are important aspects in diabetes prevention. It is desirable that there should be future research on diabetes in Rwamagana district to explore the factors influencing the people's level of knowledge of diabetes.

- There needs to be an evaluation of National Diabetic Association strategies aimed at increasing knowledge about diabetes among the Rwandan public. This will help in planning for further prevention strategies.

- A comparative study of levels of knowledge of diabetes between diabetics and non-diabetics in Rwanda is recommended by the researcher. This will help in the planning of educational programs according to the level of knowledge of target groups and the areas of deficiency in that knowledge.

- The researcher recommends that a study be undertaken exploring the level of knowledge of diabetes among health professionals in Rwanda; this will help in assessing shortcomings and that can be addressed where necessary by training programs.

- The researcher also suggests an evaluation of diabetics' knowledge about self-management in Rwanda, as self-management for diabetics is the key for preventing complications and prolonging life.

5.4 Limitations of the study

This study has attained its objectives. However there are some limitations:

Due to financial and time problems only one district was chosen for the study, and the results cannot be generalized to all districts of Rwanda.

The environment where this research was conducted may differ from others, leading to discrepancies in findings.

The questionnaire was comprised of Likert-type scales. This method often introduces central tendency bias, which is the tendency of individuals to select the middle response of the rating scale rather than using the extremes. However, this method was used as it is a widely used format and it appears that with this method respondents are more likely to feel greater freedom of expression. They also generally find them more enjoyable than other formats (Gillham, 2000). Despite these limitations, validity and reliability of instrument in this study suggested that the respondents responded with some consistency and appeared to find the measures comprehensible. Furthermore these limitations did not overshadow the strengths of the study. The major strength of this study is that it provides research into an area which has been severely limited and neglected.

5.5 Conclusion

Knowledge of T2DM can assist in early detection of the disease and reduce the incidence of complications (Wee, Ho & Li, 2002). In Rwanda, the only source of education for the general public about diabetes is awareness workshops conducted by the National Diabetic Association using the media (Radio and Television). However, they are many people who do not have access such media sources, especially in rural areas where poverty is extreme.

The aim of this study was to determine levels of knowledge and perceptions of T2DM among the general public in Rwamagana District. Knowledge about diabetes in our population was found to be inadequate and low; only 0.6% (n=1), 1.3% (n=2), 0.6% (n=1), 0.9% (n=1), 0.3%

(n=1) and 2.8% (n=3) answered correctly to the questions aimed to determine the level of knowledge regarding the meaning, signs/symptoms, causes, risk factors, management and prevention of diabetes respectively. This is probably due to inadequate information, non-availability of educational material, and lack of guidance. The reason for deficient knowledge need to be studied in further detail. Poor knowledge about risk factors for diabetes can lead to poor control of the disease and added complications. Thus there is need for large awareness programs to be arranged for the general public and also for appropriate media to be identifed and used, even in rural areas, to spread the message which could change future public attitudes.

Concerning the perceptions of diabetes, the findings from our study revealed that the main perceived causes of diabetes are excess sugar intake (80.4%) and unhealthy behaviour (57.5%) such as excessive smoking. More than half of the participants (63.8%) felt that diabetes can be prevented, and the main ways to prevent it as perceived by respondents were diabetes screening (63.8%), low-fat diets (62.2%), low alcohol intake (55.1%) and stopping smoking (41.1%). However a third (35.5%) of respondents did not believe that adopting a health behaviour can help them prevent diabetes, and a large majority (73.8%) in our study agreed that they have never made any change in their health behaviour able to prevent diabetes, with more than a third (34.6%) who said that they were not planning any behaviour change in the future. This indicates poor perceptions of diabetes prevention among participants in our study.

A large majority in our study did not perceive diabetes as widely prevalent; almost a third of the participants (31.5%) regarded diabetes as a simple disease of rich or old people. The study revealed that almost a third (31.2%) of the participants felt that they cannot develop diabetes and a majority (54.5%) thought that they there was almost no chance, or no chance at all that they could develop diabetes in next 10 years, and most did not even perceive any higher risk of developing diabetes if there is a positive family history of diabetes. This is evidence of poor perceptions about diabetes prevalence as well as low perceived risk of developing diabetes among participants in our study. An education campaign is necessary to raise awareness about diabetes risk, diabetes prevention and diabetes prevalence among the public in Rwamagana district. Recommendations have been made in this regard for the Ministry of Health, the National Diabetic Association, the local diabetic association and the authorities of Rwamagana district.

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Appendix A
Letter asking permission to conduct the study in Kigabiro sector of Rwamagana district

Madeleine Mukeshimana
Faculty of Health Sciences
School of Nursing
University of KwaZulu-Natal
Durban, South Africa
June 10, 2010

Chief Executive of Kigabiro Sector
Rwamagana District
Rwanda

Dear Sir

RE: Permission to undertake a research project in Kigabiro sector of Rwamagana District

I Madeleine Mukeshimana currently a Masters student in Community Health Nursing at the University of KwaZulu Natal humbly request your permission to conduct a research project in Kigabiro sector of Rwamagana District as part of the requirements for the award of the Masters Degree in Community Health Nursing . The title of my research project is ***Exploring knowledge and perceptions of Type two Diabetes Mellitus in a selected sector of Rwamagana District's residents: Rwanda***

Please find enclosed here with a copy of the summary of the proposal for the project.

Thanking you

Madeleine Mukeshimana

Appendix B
Letter granting permission to conduct the study

REPUBLIC OF RWANDA

EASTERN PROVINCE

RWAMAGANA DISTRICT

KIGABIRO SECTOR

Kigabiro, The 22/07/2010

No A928/011/10

To Miss Madeleine MUKESHIMANA

RE: PERMISSION TO CONDUCT A STUDY

Dear Madeleine,

Reference is made to your requesting for permission to conduct a study on your research topic which is «Exploring knowledge and perceptions of type two diabetes mellitus in a selected sector of Rwamagana district's residents: Rwanda».

I am pleased to inform you that the permission has been granted as per your proposed scheduled. I have found the topic very interesting and I am confident that your findings will help improve the knowledge of type two diabetes mellitus among residents of Kigabiro sector.

Thank you very much for choosing Kigabiro sector as your case study and we wish you success.

Sincerely,

Mr RUBIBI N. Valery

Executive Secretary of Kigabiro Sector

Appendix C
Approval by Research Ethics Committee

UNIVERSITY OF
KWAZULU-NATAL
University of KwaZulu-Natal
Research Office
Govan Mbeki Centre
Westville Campus
University Road
Chiltern Hills
Westville
3629
South Africa
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E-mail : naldoos4@ukzn.ac.za

08 July 2010

Ms M Mukeshimana
School of Nursing
Faculty of Health Sciences
Howar College Campus

Dear Mr Mukeshimana

PROTOCOL: Exploring knowledge and perceptions of Type two Diabetes Mellitus in a selected sector of Rwamagana District's residents: Rwanda
ETHICAL APPROVAL NUMBER: HSS/0447/2010 M: Faculty of Health Sciences

In response to your application dated 22 June 2010, Student Number: **208508091** the Humanities & Social Sciences Ethics Committee has considered the abovementioned application and the protocol has been given **FULL APPROVAL.**

PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 years.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Professor Steve Collings (Chair)
HUMANITIES & SOCIAL SCIENCES ETHICS COMMITTEE

SC/sn

cc: Dr. Z Z NKosi (Supervisor)
cc: Mr. S Reddy

Appendix D
Informant and informed consent letters

Information document

Title: ***Exploring knowledge and perceptions of Type two Diabetes Mellitus in a selected sector of Rwamagana District's residents: Rwanda***

Researcher: Madeleine Mukeshimana
University of Kwazulu Natal
Faculty of Health sciences
School of Nursing

Dear participant,

I am presently a master's student in community Health Nursing at the University of KwaZulu-Natal. I am currently conducting a research project on the exploration of people's knowledge and perceptions of Type Two Diabetes Mellitus in Rwanda. I am inviting you to participate in this study.

The findings from this study will be used to assess the people's level of knowledge of diabetes and their areas of deficiency in order to enable them fighting diabetes by education.

We do not ask your name so the information you provide will be anonymous and confidential. Enclosed you will find a questionnaire that will take approximately 20-25 minutes for you to complete. The questionnaire consists of a series of questions and you are asked to cross the response that seems most appropriate for you. The participation in this study is strictly voluntary, and you may refuse to participate or you may withdraw from the study at any time without any consequences. Your consent to participate in this study will be confirmed by completing the questionnaires. There are no monetary associated benefits for the participation. If you have any questions or concerns regarding this research project, please

feel free to contact me at **angemado@gmail.com**, Tel: **0788522654.** Or my supervisor at **Nkosizz@ukzn.ac.za,** Tel: **+27836457899**

Thanks you for your time and co-operation.

Regards,

Madeleine Mukeshimana. Supervisor

Informed Consent and Declaration of consent

Title: ***Exploring knowledge and perceptions of Type two Diabetes Mellitus in a selected sector of Rwamagana District's residents: Rwanda***

Dear Participant,

You have been asked to participate in a research study. You have been informed about the study by Madeleine Mukeshimana, having read the information document which has the details of the study. You may contact on **0788522654,** email, **angemado@gmail.com** at any time if you have questions about the research or also you may contact my supervisor Dr. Zerish Zethu Nkosi at **Nkosizz@ukzn.ac.za,** Tel: **+27836457899**

Your participation in this research is voluntary and you will not be penalized or lose benefits if you refuse to participate or decide to stop. If you agree to participate in this study, you will sign below this document in the space provided as show your declaration of consent and the copy of this informed consent will be given to you.

Declaration of consent

I..... (Full names of participant) hereby confirm that I understand the content of this document and the nature of the research project, and I agree to participate voluntary in this research project. I understand that I am at liberty to withdraw from the project at any time, should I so desire.

.....

.....

Signature of participant Date

Appendix E
Research questionnaire

Exploring knowledge and perceptions of Type two Diabetes Mellitus in a selected sector of Rwamagana District's residents: Rwanda

Questionnaire

Section A: Biographical data

Please Cross out the block with the information that apply to you

1.Gender	Male	
	Female	
2. Age	18 years	
	19-35 years	
	36-45 years	
	46-65 years	
3. Marital status	Single	
	Married	
	Divorced	
	Widow	
	Cohabitation	
4.Family story of diabetes	There is Diabetes in my family	
	There is no Diabetes in my family	
5.Educational level	None	
	Primary School	
	Secondary School	
	Tertiary	
6.Monthly income	≤1000 frw	
	1000-1999 frw	
	2000-2999frw	
	3000-4999fw	
	≥5000 frw	

Section B. People's knowledge of diabetes

B.1 Knowledge related to diabetes definition/meaning						
7. Do you know what diabetes is?	Yes					
	No					
8. If yes, what diabetes means for you? Please cross out the statement that best describe your response for each item		Strongly agree	Agree	Uncertain	Strongly disagree	Disagree
	a condition of high blood sugar					
	a condition of insufficient insulin					
	a condition of the body not responding to insulin					
	diabetes is non-contagious					
	a disease of rich people					
	a disease of old people					
9. Do you know how many types of diabetes are there?	Yes					
	No					
10. If yes ,please specify the types you know						
B.2 Knowledge related to signs and symptoms of diabetes						
11. Do you know	Yes					

any sign-symptom of diabetes?	No					
12. If yes, indicate the sign/symptom of diabetes. Please cross out the statement that best describe your response for each item		Strongly agree	Agree	Uncertain	Strongly disagree	Disagree
	Tiredness and weakness					
	Constant feeling of thirsty					
	Weight loss despite normal appetite					
	Blurred vision					
	Slow healing of cuts and wounds					
13. Others signs you know						

B.3 Knowledge related to the causes of diabetes

14. Do you know any cause of diabetes?	Yes					
	No					
15.If yes, please designate the cause of diabetes you know by crossing out the statement		Strongly agree	Agree	Uncertain	Strongly disagree	Disagree
	Too much sugar					
	Obesity					
	Aging					
	Less active lifestyle					
	Inheritable genetic					

that best describe your response for each item here	Excessive smoking					
	Insulin deficiency					
	Stress					
	High-fat-diets					

B.4 Knowledge related to risk factors of diabetes

16. Are you aware that there are factors able to increase the risk of getting diabetes?	Yes
	No

		Strongly agree	Agree	Uncertain	Strongly disagree	Disagree
17. If yes, please cross out the statement that best explain your answer about the factors increasing the risk to develop diabetes for each item here	Obesity					
	Hypertension (high blood pressure)					
	Age above 40 years old					
	High-fat -diets					
	Less active life style					
	Family history of Diabetes					
	Pregnancy					
	High alcohol intake					
	Excessive sugar intake					

B.5. Knowledge related to treatment and management of diabetes at the community level

18.Do you know the available medicines for diabetes	Yes
	No

19. If yes, please specify the medicines						
20.Please indicate where you know diabetic patients can get emotional support in your community	From their family members					
	From their friends					
	From doctors/nurses					
	From a local diabetic association					
21. If someone who is diabetic comes to you for advice concerning the diet, will be you be able to help him/her?	Yes					
	No					
22. If yes please specify the kind of foods you can advice him/her						
23. If a diabetic falls in coma, do you know how you can help him-her immediately?	Yes					
	No					
24. If yes please, specify what you can do						
25. If you are a diabetic or know someone who is diabetic, what will you do or tell that person to do in order to manage the disease and to prevent complications? Please cross out the statement that best describe your answer.		Strongly agree	Agree	Uncertain	Strongly disagree	Disagree
	To have and respect diet					
	To visit health workers for medicines and advices					
	To exercise regularly					
	To avoid stress by resting					

	To quit smoking					
	To eat as much as possible to be healthy					

B.6. Knowledge related to diabetes prevention

26. Do you know how a person can prevent diabetes?	Yes I know					
	No I do not know					
27. If yes, please indicate what a person can do to prevent diabetes by crossing out the statement that best explain your response for each item.		Strongly agree	Agree	Uncertain	Strongly disagree	Disagree
	Eating healthy low-fat diets					
	Eating high-fiber diet					
	Exercising					
	Quit smoking					
	Diabetes screening					
	Keeping alcohol consumption low					
	Avoiding obesity					
28. Others						

Section C: People's perceptions of diabetes

C.1 Perceptions of causes						
		Strongly agree	Agree	Uncertain	Strongly disagree	Disagree
29. For each item given here, please cross out the statement that best describe your thinking about what causes diabetes	A genetic cause : running in family					
	Socio- economic causes (e.g. stress, poverty)					
	Unhealthy behavior styles (e.g. : excess alcohol intake , excess smoking, lack of physical activity)					
	Unhealthy food intake (e.g. too much sugar intake, high-fat food, too much drink-sweet					
	Obesity (excess weight)					
	Age (old people)					
	God's will					
	People (Diabetes is caused by people : poison, witchcraft)					
30. Other causes						
C2.Perceptions of complications						
31. Do you think diabetes is a	Yes					

severe disease?	No	
32. According to your understanding, how can you compare diabetes	Diabetes equal death	
	Diabetes is simple disease for rich people	
	Diabetes is simple disease for old people	
	Diabetes is severe but curable disease	
	Diabetes is severe but manageable disease	

C.3 Perceptions of diabetes treatment

33. Do you think diabetes can be cured?	Yes	
	No	
34. If yes, please indicate what can cure diabetes according to your thinking	Western medicine	
	Traditional medicine	
	Traditional healers	
	God (by praying and fasting)	
35. Do you know any traditional herbs able to cure diabetes?	Yes	
	No	
36. If yes, please specify the name (s) of that (those) traditional herbs able to cure diabetes		

37. If you know someone who suffers from diabetes, what advice will you give him/her to manage that disease? Please cross out the statement that		Strongly agree	Agree	Uncertain	Strongly disagree	Disagree
	Praying and fasting					
	To see traditional healers					

best describe your response for each item given here	To see The Medical doctor					
	To search the Herbal medicines for curing Diabetes					
	To eat vegetables and non-fat and non-sweet foods					
	To combine traditional medicine and Western treatment					

C.4 Perceived risk

38. If there is diabetes in your family, this means that:	You have the high risk to develop diabetes more than the person from the family without diabetes in his/her family	
	Your risk of develop diabetes is equal as someone who is from the family without diabetes	
	You do not have any risk to develop diabetes	
39. If there is no diabetes in your family, this means that	You may or may not have diabetes	
	You will never have diabetes	
40. Do you feel as you can develop diabetes?	Yes, I feel I can develop Diabetes	
	No, I feel I carınot develop Diabetes	
41. If yes, please specify why you feel you can get diabetes	I feel that I have little control over risks to my health.	
	If I am going to get diabetes, there is not much I can do about it.	
	I fell that I can get Diabetes because I am old	

	I feel that I can get Diabetes as anyone else can get it.	
42. If no, please specify why you fell you cannot get diabetes	I feel that I will never get Diabetes as there is no Diabetes in my family	
	I feel that I will never get Diabetes as I do not eat a lot (I am not a rich)	
	I feel that I cannot get Diabetes because I am young	
43. What do you think your risk or chance is for getting diabetes over the next 10 years?	Almost no chance	
	Moderate chance	
	High chance	
	No chance	

C. 5 Perceptions of prevalence

		Strongly agree	Agree	Uncertain	Strongly disagree	Disagree
44.For each item here, please let us know the response that best describe your opinion about diabetes prevalence	Diabetes is increasing in the world					
	Diabetes is less increasing in Africa					
	Diabetes is less frequent in Rwanda					
	Diabetes is more frequent in Rwanda					
	Diabetes is more prevalent in America and rich countries					
	Men are more vulnerable to diabetes than women					
	Elderly are more vulnerable to diabetes					

C. 6 Perceptions of diabetes prevention

		Strongly agree	Agree	Uncertain	Strongly disagree	Disagree
45. For each item here, please cross out the statement that best describe your thinking about diabetes prevention	Diabetes can be prevented					
	Diabetes cannot be prevented					
	Preventing diabetes is much cost					
	Preventing diabetes is only possible for rich people					
46. For each item given here, please cross out the statement that best describe your opinion about possible ways of preventing diabetes	Stop smoking can prevent diabetes					
	Low fat diet can prevent diabetes					
	Low intake alcohol can prevent diabetes					
	diabetes screening is very important for preventing diabetes					
	Nothing can prevent diabetes because it is an inherited disease					
47. What do you think else can prevent diabetes:						

C.7 Perceptions about behaviour change

48. Do you think adopting a health behavior such as, exercise, diabetes screening, quite smoking; lower alcohol can prevent you from developing diabetes?	Yes	
	No	
49. Have you recently made changes in any lifestyle behaviors that you believe will lower your chances of	Yes	
	No	

getting diabetes?	I do not remember	
50. Are you planning to make changes in any lifestyle behaviors in the near future that you believe will lower your chances of getting diabetes?	yes	
	No	
	I am still thinking about it	